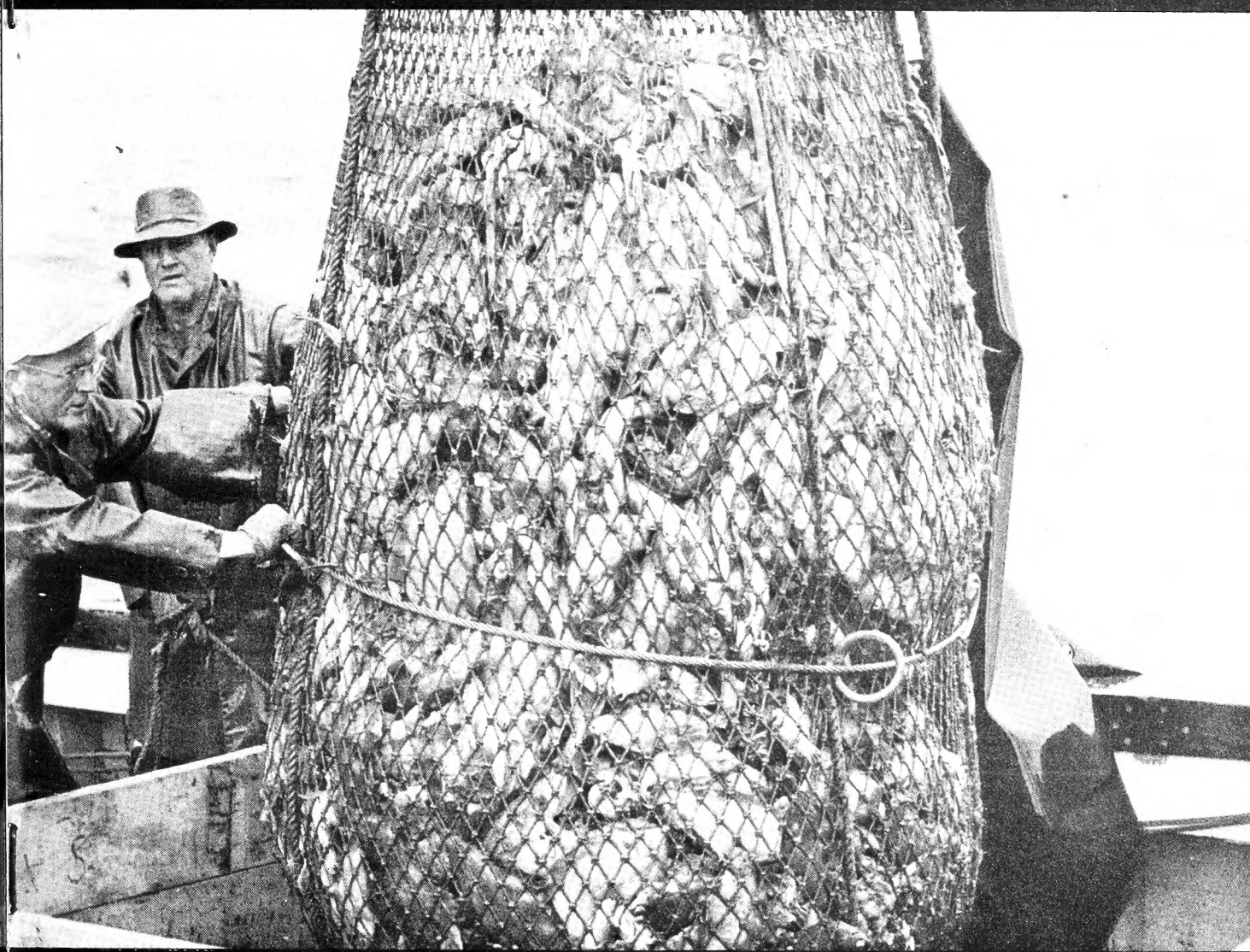


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ROBERT H. BIRDS JR.

COMMERCIAL FISHERIES REVIEW



Vol. 15, No. 10

OCTOBER 1953

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Washington, D.C.



COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries
prepared in the BRANCH OF COMMERCIAL FISHERIES



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CONTENTS

COVER: A NET LOAD OF FISH CAUGHT BY THE U. S. FISH AND WILDLIFE SERVICE'S EXPLORATORY FISHING VESSEL JOHN N. COBB DURING A SIX-WEEK DEEP-WATER TRAWL EXPLORATION OFF THE WASHINGTON AND OREGON COASTS. (SEE PAGE 5 OF THIS ISSUE.)

	PAGE
TUNA FISHING AT TAHITI, BY WILVAN G. VAN CAMPEN	1
DEEP-WATER TRAWLING SURVEY OFF THE OREGON AND WASHINGTON COASTS (AUGUST 25-OCTOBER 3, 1952), BY DAYTON L. ALVERSON	5

	PAGE		PAGE
RESEARCH IN SERVICE LABORATORIES:	16	TRENDS AND DEVELOPMENTS (CONTD.):	
PROGRESS ON PROJECTS, SEPTEMBER 1953 ...	16	NEW YORK:	
PROGRESS ON FISHERY TECHNOLOGICAL RESEARCH PROJECTS, FISCAL YEAR 1953	19	HUDSON RIVER SHAD CATCH DECLINED IN 1953	36
PROGRAM FOR FISHERY TECHNOLOGICAL RESEARCH, FISCAL YEAR 1954	25	NORTH ATLANTIC FISHERY INVESTIGATIONS: EFFECT OF COD-END COVER UPON HADDOCK ESCAPEMENT TESTED BY <u>ALBATROSS III</u> (CRUISE 52)	37
REPORTS PUBLISHED DURING FISCAL YEAR 1953 ON SPECIFIC PHASES OF FISHERY TECHNOLOGICAL RESEARCH	28	OCEAN PERCH DISTRIBUTION STUDIED BY <u>ALBATROSS III</u> (CRUISE 53)	37
TRENDS AND DEVELOPMENTS:	30	ZERO-AGE HADDOCK DISTRIBUTION STUDIED BY <u>ALBATROSS III</u> (CRUISE 54)	38
ADDITIONS TO THE U. S. FLEET OF FISHING VESSELS	30	NORTH PACIFIC EXPLORATORY FISHERY PROGRAM:	
CANS--SHIPMENTS FOR FISHERY PRODUCTS, JANUARY-JULY 1953	30	SALMON RESOURCES ADJACENT TO ALEUTIAN ISLANDS INVESTIGATED BY <u>JOHN N. COBB</u> (CRUISE 16)	38
CALIFORNIA:		OHIO'S LAKE ERIE COMMERCIAL FISHERIES PRODUCTION, 1952	39
NO SARDINES OFF COAST	31	PACIFIC OCEANIC FISHERY INVESTIGATIONS: UNEXPLOITED TUNA RESOURCE CLOSE TO HAWAII FOUND BY <u>JOHN R. MANNING</u> (CRUISE 16)	40
OCEANOGRAPHIC DATA AS RELATED TO PACIFIC SARDINE COLLECTED BY <u>YELLOWFIN</u> (CRUISE 53-Y-6)	31	<u>CHARLES H. GILBERT</u> SCOUTS FOR TUNA IN HAWAIIAN WATERS (CRUISE 11)	41
TUNA TAGGED OFF BAJA CALIFORNIA BY M/V <u>VIRGINIA R.</u> (CRUISE C-2-53)	31	SKIPJACK TUNA CONCENTRATIONS DISCOVERED OFF HAWAIIAN ISLANDS BY <u>CHARLES H. GILBERT</u> (CRUISE 13)	41
TUNA TAGGED BY M/V <u>DEFIANCE</u> (CRUISE C-3-53)	32	<u>CHARLES H. GILBERT</u> SCOUTS FOR TUNA BETWEEN HAWAII AND WEST COAST (CRUISE 14)	42
FISH AND GAME COMMISSION ACTIONS	32	HYDROGRAPHIC AND BIOLOGICAL DATA AROUND HAWAIIAN ISLANDS COLLECTED BY <u>HUGH M. SMITH</u> (CRUISE 21)	42
FEDERAL PURCHASES OF FISHERY PRODUCTS ..	33	STATES GET OVER \$4 MILLION FEDERAL AID FOR FISH RESTORATION	43
FLORIDA:			
ANOTHER "RED TIDE"	33		
INDONESIANS TO STUDY MODERN FISHERY DEVELOPMENT MANAGEMENT IN UNITED STATES ..	34		
LEASE BID RECEIVED FOR AMERICAN SAMOA FISH CANNERY	34		
HUGE HALIBUT PRESENTED TO PRESIDENT	35		
MAINE:			
DEAD HERRING OFF COAST	36		
NEW ENGLAND TUNA EXPLORATIONS:			
POOR TUNA FISHING REPORTED BY <u>MARJORIE PARKER</u> (CRUISE 2)	36		

COMMERCIAL FISHERIES REVIEW

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TUNA FISHING AT TAHITI

By Wilvan G. Van Campen*

In February of this year the U. S. Fish and Wildlife Service's vessel John R. Manning, operating from Pacific Oceanic Fishery Investigations' Honolulu base and fishing a series of tuna long-lining stations across the equatorial current system on 140° and 150° west longitude, put in at Papeete, Tahiti, for refueling. Some observations of the Tahitian tuna fishery were made with the primary objective of picking up any information on fishing methods which might be applicable elsewhere in the Pacific, particularly in those United States island possessions which need an augmented protein food supply or which are considered potential locations for tuna-cannery development. In this latter connection, interest in the Tahitian situation was heightened by the fact that on another recent POFI cruise some samples of tuna canned in Tahiti were obtained in the Marquesas, and it was anticipated that Tahiti might prove to be a model of an isolated tropical island with a small population and limited technical resources (i. e. like America Samoa) which was nevertheless able to keep a tuna cannery in operation (as Samoa has so notably not been able to do).

It was found, in fact, that the Tahitian tuna fishery is quite primitive in nature, and that it has not proven capable of supporting even a modest canning industry in normal

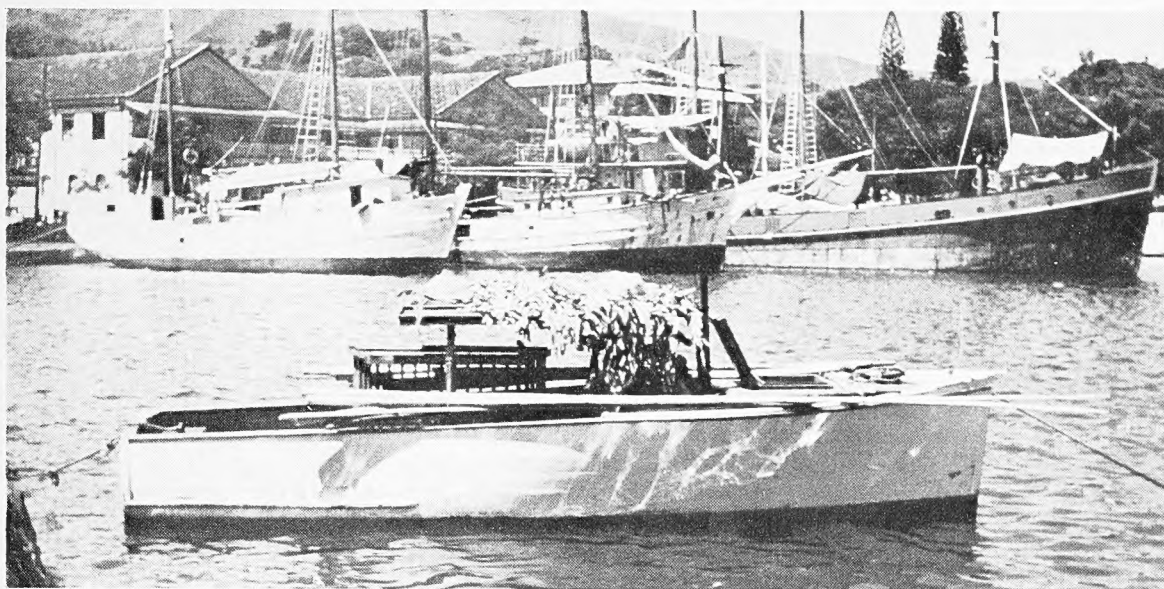


FIG. 1 - A TYPICAL TAHITIAN TUNA BOAT IN PAPEETE HARBOR. NOTE THE FISHING POLES ALONG THE SIDES AND THE BUNDLE OF DRY LEAVES FOR SHADE ON THE COCKPIT CANOPY.

times, although it does supply abundant and fairly cheap fresh fish to the Island's people. The information obtained in the course of a brief stay at Papeete is necessarily incomplete, and is derived more from interviews with local people than from first-hand observation; however, it may be of some general interest in the absence of any more complete accounts.

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The tunas commonly taken at Tahiti are the yellowfin (*Neothunnus macropterus*), called "thon" in French and "a'ahi" in Tahitian, and the skipjack (*Katsuwonus pelamis*), called bonite in French and auhopu in Tahitian. No big-eyed tuna, albacore, or little tuna were seen in the market, nor did the persons interviewed appear to recognize descriptions of these species. Some informants spoke of another kind of tuna called *va'o*, apparently the dog-toothed tuna, which was said to be abundant around the reefs and passes of the Tuamotus, though less common around the high islands. The yellowfin and skipjack seen in the market and being unloaded from the fishing boats were of very mixed sizes, ranging from an estimated 5 pounds to about 50 or 60 pounds each in the case of yellowfin and to perhaps 40 pounds each for the skipjack. When the observer remarked on the unusually large size (by Hawaiian standards of comparison) of some of the skipjack, he was told that even larger ones--up to 70 pounds--were sometimes brought in. Although this might be an exaggeration, it is interesting to note that a news story in the *Pacific Fisherman* of March 1950 contains a report of three-pole skipjack tuna (75 pounds) taken by a Hawaii-based vessel which fished in the Tahiti area.

The Tahitian tuna boats are of uniform design, about 18 to 25 feet in length, and very much like small sport-fishing cruisers in general appearance. They are powered with 9 to 18 hp. Diesel engines of French manufacture. They carry no ice. The catch is kept on the floor of the small cockpit. Their only water supply is a bottle filled on the quay, and the only visible concession to comfort is a heap of dried leaves on the roof which is supposed to keep the cockpit cool. Each boat carries three fishermen, and there are said to be about 20 such boats at Tahiti, most of them based at Papeete. The boats are almost all owned by people ashore, and the proceeds are split 50-50 between the owner and the fishermen. The operating radius of the fleet is about 30 miles from Tahiti. The normal schedule is to put out to sea at around 8:00 a.m. and return at anywhere from 5:00 p.m. to midnight. The boats fish all around the island of Tahiti, often cross the 8-mile channel to Moorea, and sometimes go as far as the atoll of Tetiaroa, 25 miles north of Tahiti, where the fishermen sleep on the beach all night.

The tuna schools are located by sighting the flocks of birds which accompany them, and the fishing is done with pole and line, using pearl-shell jigs of the traditional Polynesian type. The poles, of which four or five are carried lashed along the gunwales on

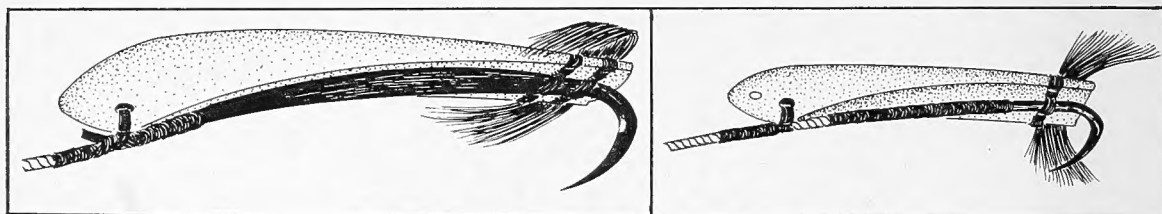


FIG. 2 - TAHITIAN TUNA LURES. THE SMALLER HOOK ($3\frac{1}{2}$ INCHES LONG) IS OF THE TYPE USED FOR SKIPJACK, THE LARGER ($5\frac{1}{2}$ INCHES LONG) IS FOR LARGE YELLOWFIN. THE BODY OF THE LURE IS MADE FROM THE THICKEST PART OF A PEARL OYSTER SHELL, THE HOOK IS OF BEATEN COPPER, AND THE TUFT OF PIG BRISTLES AT EACH SIDE OF THE AFTER END IS SUPPOSED TO KEEP THE JIG IN THE PROPER POSITION AS IT IS TRAILED ON THE SURFACE.

each side of the boat, are about 12 to 16 feet long, of a light, thin-walled local bamboo. They are perfectly plain, with no serving or wrapping on the grip. The line is slightly shorter than the pole. While fishing, the boat is kept under way and moving with the school at all times, and the pearl-shell jig is slapped and played on the surface in such a way as to attract the tuna. Live bait is never used, nor is there any spray or splashing of water over the lure. As in all islands where the Polynesian method of tuna fishing is used, it is believed that fine nuances of color in different shell hooks in relation to light conditions and to the color of the natural feed which the tuna are taking have an important effect on the success of the fishing. While on a school, the fishermen change lures frequently in order to find the one which will be most attractive to the fish. Differences in color and sheen imperceptible to the unpracticed eye may give one hook a very high value while another apparently identical one will be considered almost worthless. Pearl shells from certain islands, or from certain spots on the reefs of certain islands, are reputed to make especially effective hooks.

In addition to the jigging of fish from surface schools, large tuna and marlin are sometimes hand-lined from canoes at well-known "tuna holes" ('apo'o a'ahi), some of which are quite close to the reef. Trolling appears to be completely unknown as a commercial fishing method, but occasionally when a boat is fishing a school and large yellowfin tuna show up mixed with the smaller fish they are taken on hand lines with cut bait.

The seasons for tuna fishing at Tahiti are said to be January-March and July-August, but some fish are taken throughout the year. It was reported that the same sizes of fish are present in Tahitian waters at all times of the year. Unfortunately, the seasons of abundance of the tunas coincide with the peak seasons for the atule (big-eyed scad, *Selar crumenophthalmus*), which is generally preferred by the Tahitians. Thus, when big catches of atule and tuna come into the market at the same time, the tuna may be sold at give-away prices, or they may even have to be thrown away. No use is made of refrigeration, nor of salting or sun-drying, to preserve fish. The market closes at 7:00 p.m. and fish brought there after that hour are simply left to hang in very warm air temperature until the next morning. Fortunately there are remarkably few flies in Tahiti, but nevertheless much of the fish consumed around the island looks far from fresh. It may be because of this general staleness of the raw material that the Tahitians prepare most of their tuna or atule by marinating it in lime juice and salt and then serving it in coconut cream. This is the staple fish dish, but large tuna are sometimes baked in the *imu* or earth oven.

A good day's catch for a Tahitian tuna boat is said to be 20 to 30 40-pound fish, but from the writer's observations a proportionately larger number of 10- to 20-pound fish would be more usual. The fish are tied by the tails with leaves into bunches of 2



FIG. 3 - TAHITIAN FISHERMEN UNLOADING SMALL YELLOWFIN FROM THEIR BOAT AND HANGING THEM ON A SHOULDER-POLE FOR TRANSPORTATION TO THE MARKET.

to 8 or 10, depending on the size, hung on a carrying pole, and shoulder-carried about 3 blocks from the quay to the market. At the public market (a concrete-floored, open-sided structure extending clear across one city block) the fish are hung up on iron rails and sold by the fishermen or their womenfolk. No scales are used to weigh the fish. They are sold individually for the most part. Smaller ones are sold by the bunch and the larger tuna are halved or quartered. Prices are arrived at by haggling at each sale, and may vary considerably between the opening and closing of the market. A fair aver-

age was quoted as 40 to 60 francs (65¢ to \$1.00) for a 10-pound tuna. The busiest time at the market is early Sunday morning, when the people who have come into town for Saturday night are purchasing fish and other foodstuffs to take back to the country with them. At such times the market is the scene of extremely spirited activity, and the guards are sometimes hard put to it to maintain order in the surging mob of competing shoppers. Aside from such traffic-directing duties, the chief concern of the market attendants seem to be to see that all fish are hung off the floor on the iron rails provided for that purpose.

A small cannery formerly packed tuna at Papeete, and this was the source of the samples obtained by POFI personnel in the Marquesas. The plant was established in 1939 in connection with a scheme for a pineapple industry, and when this fruit proved to be unsuited to Tahiti's humid climate, the facilities were converted to the processing of yellowfin and skipjack tuna. The pack was put up in tall salmon cans, and most of it was canned in coconut oil, although some imported salad oil was used. The operator used as much hand labor as possible, since labor is fairly cheap in Tahiti, and worked up to a capacity of about 2 tons per day and an output of 2 to 3 thousand cases per year. The average price paid for the fish ran around \$80 a ton. No one connected with the enterprise seems to have had any experience in fish packing, and the product, which was not a solid pack, was probably rather crude and variable, but in the years immediately after World War II, when food of any sort was in short supply in Europe, the business prospered. The bulk of the pack was always sent to France. Only a small amount of skipjack in coconut oil was sold in French Oceania.

With the return of normal market conditions in France, this unorthodox product became less saleable, and the cannery finally ceased operations in 1947. The machinery has been dismantled and stored, and has been up for sale for several years. The former operator ascribes the failure of the enterprise to the irregular and unpredictable supply of fish, the reluctance of jobbers to handle such a small number of cases, and the effects of unsettled world conditions and transportation difficulties on his supply of imported materials, chiefly tin plate.

The story of tuna canning in Tahiti is in part merely a repetition of the same sad tale which has been heard from other Pacific islands where the development of a tuna industry has been tried--"no bait." Without the use of live bait, not enough fish could be taken out of the surface schools to keep the cannery supplied, and the local fishermen lacked the knowledge and probably the capital to try long-lining. Vessels from Hawaii with experienced live-bait fishermen prospected in Tahitian waters, but were unable to find any adequate source of bait. Whether or not a tuna-canning industry can be supported by long-line fishing in the central Pacific is a question which must wait until someone makes the attempt, but the Tahitian experience seems to indicate that fishing the surface schools by the Polynesian method, without the advantage which live-bait confers, will not give enough return per unit of effort to produce a surplus of fish for canning.

On the other hand, the existing tuna fishery at Tahiti is evidence of the fact that an adequate supply of fresh tuna for an island population's needs can be obtained in the ancient Polynesian way even in the absence of a live-bait supply. Islands where the supply of protein food is inadequate, where there are suitable stocks of tunas in nearby waters, and where the natives are willing to exert themselves to catch tuna and to eat them once they are caught, would appear to be promising locales for the introduction (or reintroduction) of this method of fishing.



DEEP-WATER TRAWLING SURVEY OFF THE OREGON AND WASHINGTON COASTS

(AUGUST 25-OCTOBER 3, 1952)

By Dayton L. Alverson*

SUMMARY

A deep-trawling investigation off the Oregon and the Washington coasts was conducted by the Service's exploratory fishing vessel John N. Cobb from August 25 to October 3, 1952. The work was carried on in deep water adjacent to the present commercial fishing grounds of the local otter-trawl fleet.

Exploratory fishing was confined between Cape Foulweather and Cape Lookout, Oregon, and between Cape Elizabeth and Destruction Island, Washington. A total of 48 otter-trawl drags were made at depths ranging from 100 to 400 fathoms.

The continental slope off the Oregon coast was found to be rather gentle, having a number of terraces, ridges, and hills. The bottom in this region is mostly free of obstructions and suitable for trawl fishing. Off the Washington coast the continental slope is quite steep, and a number of snags were encountered.

Three commercially-utilized species of fish (Dover sole, sablefish, and Pacific ocean perch) dominated the catches. Dover sole and Pacific ocean perch were taken from depths between 100 and 240 fathoms. These two species were mixed in catches made off Cascade Head, Oregon. Sablefish were taken over the complete depth range fished; however, those in deep water were small and in poor shape.

Other fish taken included varieties of red rockfish, arrowtoothed flounder, rex sole, slender sole, hake, and several types of skates. Trash fish such as hake and skates were taken in most drags, but they represented only a small portion of the total catch.

OBJECTIVES OF EXPLORATION

In a continuation of the program initiated in the summer of 1951, the U. S. Fish and Wildlife Service's exploratory fishing vessel John N. Cobb made a six-week deep-water trawl exploration off the coasts of Oregon and Washington during late summer and early fall of 1952. The objectives of this investigation were: (1) to ascertain the availability and the abundance of marine bottom fishes in the deep waters adjacent to the present commercial fishing grounds of the local otter-trawl fleet; (2) to determine the commercial varieties of fishes inhabiting these deeper waters; (3) to gain information regarding technical problems involved in handling fishing gear in deep-water trawl work; and (4) to obtain catch information which would be of value in analyzing the practicability of commercial exploitation of these regions.

AREA EXPLORED

Exploratory fishing was conducted off the coast of Oregon between latitudes 44°47' N. and 45°21' N. and off the coast of Washington between latitudes 47°22' N. and 47°41' N. These areas roughly correspond to the waters between Cape Foulweather and Cape Lookout, Oregon, and between Cape Elizabeth and Destruction Island, Washington. The vessel left Seattle on August 25, and spent the first

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four weeks working off the Oregon coast. The remainder of the trip was devoted to investigating waters off the Washington coast. During the cruise a total of 48 otter-trawl drags were made at depths ranging from 100 to 400 fathoms.



FIG. 1 - EXPLORATORY DRAGS, AREAS OF SPECIAL FISHING INTEREST, AND BOTTOM CONTOURS--OREGON COAST.

The geographical areas explored and the general bottom topography are shown in figures 1 and 2.

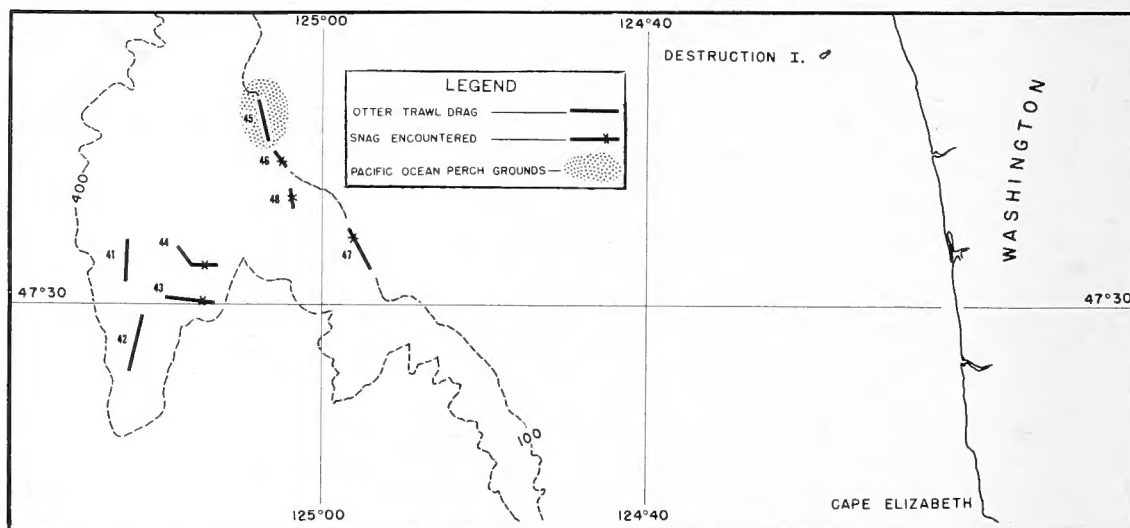


FIG. 2 - EXPLORATORY DRAGS, AREAS OF SPECIAL FISHING INTEREST, AND BOTTOM CONTOURS--WASHINGTON COAST.

The area explored off the Oregon coast measured 34 miles north and south and extended nearly 40 miles offshore. The continental slope^{1/} in this region is relatively gentle, having an average gradient of about 2 percent (Shepard 1948). The width of the slope between the 100- and the 500-fathom contour lines varies between 20 and 30 miles, and a number of terraces, ridges, and hills exist along the gentle slope. Bottom samples from this region were predominantly mud; however, gravel and rock were found in a few localized areas. The bottom dragged was mostly free of obstructions and suitable for trawl work.

The area explored off the Washington coast measured 19 miles north and south and extended 35 miles seaward. The slope characteristic in this region was somewhat steeper, with the average width between the 100- and the 400-fathom contour lines being only 10 miles. Trawling bottom between 100 and 300 fathoms was poor and a number of snags were encountered. Below 300 fathoms a small terraced region was located which was free of obstructions. Bottom samples showed mud with some stones or boulders. Several days were spent in an effort to locate favorable bottom on the offshore seamount discovered by the John N. Cobb in 1950 (Powell, Alverson, and Livingstone 1952); however, the fathograms showed only abrupt, steep slopes unsuitable for trawling.

METHODS USED

Commercial fishermen familiar with the trawl-fishing grounds along the Oregon and the Washington coasts assisted in laying out the desirable areas to be investigated. This procedure minimized the overlapping of areas to be explored with those already under exploitation by the otter-trawl fleet.

The method of locating suitable trawling bottom was identical to that used in the John N. Cobb's 1951 trawl exploration (Alverson 1951). Navigation charts showing soundings were studied to learn the characteristics of the bottom topography. Regions which appeared to be satisfactory for dragging operations were sounded with a constant recording-type echo sounder, and if the resultant fathogram was relatively uniform a drag was made.

Trawling methods used were similar to those commonly employed by the Pacific Northwest otter-trawl fleet. The net was set from the stern of the vessel and picked up on the starboard side. Catches were placed into deck bins of known cubic volume and the total weight of the fish was estimated from the occupied volume. Various conversion factors (volumes to weight) used for the several dominant species were obtained from data supplied by Seattle fish dealers.

Drags were made for a period of one or two hours, depending on the depth and type of bottom. Generally the deeper drags were towed for two hours. Positions were determined from loran readings which were taken after the net had been set and again at the time hauling of the gear began.

TYPE OF GEAR

All exploratory drags were made with a standard 400-mesh Western trawl^{2/} similar to the commercial trawl nets in use in the Pacific Northwest. Ten 8-inch-diameter spherical aluminum floats were attached to the head rope of the trawl, 3 on each wing of the net, and 4 across the throat of the net. The 4 floats across the throat of the net were the "plane-type" with a lifting collar around

^{1/}THE SLOPE LEADING FROM THE EDGE OF THE CONTINENTAL SHELF (APPROXIMATELY 100 FATHOMS) TO THE GREATER DEPTHS OF THE OCEAN.

^{2/}FOR DETAIL SPECIFICATIONS OF NET USED SEE COMMERCIAL FISHERIES REVIEW, VOL. 13, NO. 11 (NOVEMBER 1951), PP. 4-5.

the lower portion of the sphere. Recent tests by British investigators (Anonymous 1952) have shown this type of float to be greatly superior in its lifting ability as compared to other trawl floats of equal static bouyancy.

RESULTS

Detailed results of all exploratory drags have been tabulated and are presented in table 1. These drags are diagrammatically illustrated in figures 1 and

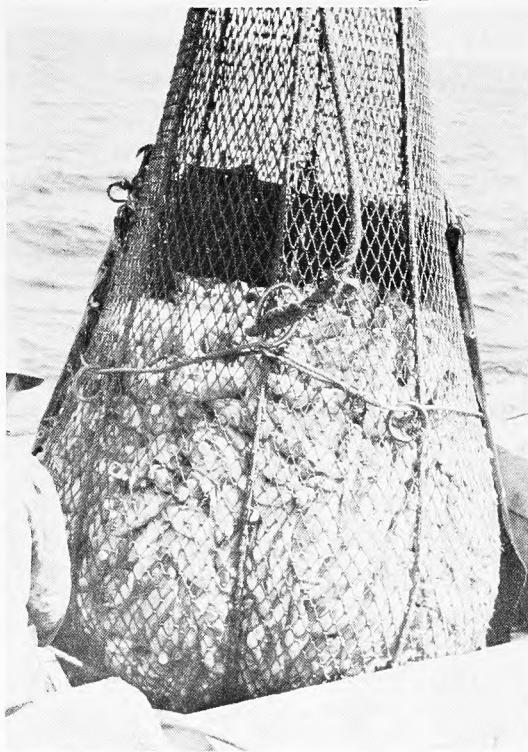


FIG. 3 - A CATCH OF BOTTOM FISH ABOUT TO BE RELEASED INTO THE DECK BIN.

catches of Pacific ocean perch. The best catches of Dover sole were taken west of Cascade Head, Oregon, at depths from 200 to 242 fathoms. The bottom in this area was clear of obstructions and composed of gray mud. Fair catches were also made west of Siletz Bay, Oregon, in 120 to 122 fathoms. Samples of Dover sole taken from the area west of Cascade Head averaged 15 inches in length, with the sex ratio of males to females being approximately equal. For best Dover-sole catches see drags 13, 16-19, and 21 in the fishing log.

SABLEFISH: These fish were taken in small quantities over the entire depth range fished; however, sablefish from depths below 250 fathoms were usually small and had a soft-flesh texture. Drag No. 10 in 300 to 304 fathoms, west of Cascade Head, Oregon, produced 1,000 pounds of sablefish, but only 65 percent of the fish were of marketable size. Fish taken from depths between 100 and 200 fathoms appeared in good shape and averaged from 7 to 9 pounds in weight.

PACIFIC OCEAN PERCH: This species was found to be the most abundant fish taken during the 1952 deep-water trawl investigation. The best catches of Pacific ocean perch were made between 120 and 230 fathoms. Below 250 fathoms the fish was seldom taken. Good catches were made off the Oregon coast from Nestucca Bay

3/Drag number 40, made on the offshore seamount, is not shown on the charts.

2,3/ which also include areas of special fishing interest, snags, and bottom contour lines. The positions given in the fishing log are the starting point of each drag, and the courses are the resultant direction between the starting point and the end of each drag. For best results in plotting drags given in the fishing log, readers are referred to U. S. Coast and Geodetic Survey Chart No. 6002, Columbia River to Destruction Island, and No. 5902, Yaquina Head to Columbia River.

Three commercially-utilized species of fish--Dover sole (Microstomus pacificus), sablefish (Anoplopoma fimbria), and Pacific ocean perch (Sebastodes alutus)--dominated the catches. Dover sole and Pacific ocean perch were taken in fair quantities between 100 and 225 fathoms, while sablefish were taken somewhat deeper. The shaded areas shown on figures 1 and 2 indicate regions in which catches of the different species of 500 pounds per hour or greater were taken.

DOVER SOLE: This species was taken off the Oregon coast generally mixed with

south to Cape Foulweather. Drag No. 39 (not shaded on the chart) produced a good show of Pacific ocean perch, but the bag tie-line broke and the catch was lost. A fair catch of this fish was also made southwest of Destruction Island, Washington, in 100 fathoms.



FIG. 4 - A DECK BIN FULL OF DOVER SOLE AND PACIFIC OCEAN PERCH.



FIG. 5 - A "FLOATER" (FULL COD END) OF PACIFIC OCEAN PERCH BEING BROUGHT ALONGSIDE THE VESSEL.

Practically all of the Pacific ocean perch taken off the Oregon and the Washington coasts were of commercially acceptable size (of several hundred fish examined, no immature specimen was noted). For best Pacific ocean perch catches see drags 13, 16-19, 21-23, 30 and 45.

OTHER ROCKFISH: A number of other species of rockfish were found commonly associated with catches of Pacific ocean perch. These included the black-mouthed rockfish (Sebastodes crameri), the pop-eyed rockfish (Sebastodes saxicola), the black-throated rockfish (Sebastodes introniger), the rosy rockfish (Sebastodes rosaceus), the split-nosed rockfish (Sebastodes diplopros), and the round-finned rockfish (Sebastolobus alascanus). Of these species, the pop-eyed rockfish is the most difficult to distinguish and separate from the Pacific ocean perch.



FIG. 6 - TWO LARGE ROCKFISH TAKEN IN 240 FATHOMS OF WATER.

OTHER FISH TAKEN: Rex sole (Glyptocephalus zachirus), arrow-toothed flounder (Atheresthes stomias), slender sole (Lyopsetta exilis), hake (Merluccius productus), and many species of red rockfish were common in deep-water hauls. English sole (Parophrys vetulus), petrale sole (Eopsetta jordani), lingcod (Ophiodon elongatus), and the varieties of black rockfish taken by trawlers fishing the continental shelf were almost entirely absent from catches made below 100 fathoms. Trash fish, such as hake and several varieties of skates, were

taken in the majority of the drags; however, they generally represented only a small percentage of the total catch.

Table 1 - Fishing Log of Deep-Water Trawling Exploration off the Coasts of Oregon and Washington, 1952

DRAG NUMBER	1	2	3	4	5	6	7	8	9	10
Date	8/27/52	8/27/52	8/27/52	8/28/52	8/28/52	8/28/52	8/29/52	8/29/52	8/29/52	8/30/52
Latitude N.	45° 00.0'	44° 56.8'	44° 52.6'	45° 17.6'	45° 15.1'	45° 15.1'	45° 56.6'	45° 13.4'	45° 10.2'	45° 02.5'
Longitude W.	124° 20.7'	124° 22.7'	124° 27.1'	124° 23.9'	124° 21.9'	124° 21.9'	124° 23.2'	124° 21.2'	124° 16.6'	124° 15.6'
Loran Reading	2602	2573	2521	2827	2791	2794	2810	2776	2730	2637
Loran Reading	3415	3420	3400	3415	3417	3417	3417	3416	3377	3366
Sea	Mod. swell	Mod. swell	Mod. swell	Mod. swell	Lt. swell	Lt. swell	Calm	Calm	Calm	Mod. swell
Course, Magnetic	183°	218°	015°	335°	302°	302°	127°	175°	316°	330°
Depth Range in Fathoms	100	100	100	200	200-202	200	200	200-202	294-303	300-304
Type of Bottom	Mud	Gn. M.	Gn. M.	Gn. M.	-	-	Gn. M.	Gn. M.	Rocky	Mud
Trawling Bottom	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Snag	Clear
Elapsed Time on Bottom	1 hr.	1 hr.	1 hr.	1 hr.	1 hr.	1 hr.	1 hr.	2 hrs.	2 hrs.	2 hrs.
Estimated Total Catch in Pounds	1460	600	1600	400	Crossed doors	Crossed doors	800	2100	300	1900
Species	None	None	None	None	None	None	None	None	None	None
Catch in Pounds (% Marketable):										
Flat Fish:										
Dover	Few (50%)	10 (80%)	450 (75%)	100 (80%)			150 (95%)	800 (90%)	Few (100%)	100 (70%)
Petrale	Few (100%)	10 (100%)	10 (100%)	*Q (100%)			*Q (100%)	Few (80%)		
Rox			50 (75%)	Few (100%)			Few (100%)	100 (70%)		
Arrow-toothed Flounder (Turbot)	200 (75%)	50 (90%)	500 (80%)							
Round Fish:										
Hake	Few (100%)	Few (100%)	Few (100%)	Few (100%)			Few (100%)	Few (100%)	Few (100%)	Few (100%)
Lingcod	20 (100%)	*Q (100%)								
Pollock		100 (100%)								
Sablefish	200 (95%)		50 (100%)	50 (75%)			300 (95%)	450 (90%)	100 (50%)	1000 (65%)
Shark										
True Cod										
Rockfish:										
Black	200 (100%)	180 (100%)	10 (100%)	25 (100%)						
Pacific Ocean Perch	200 (50%)	20 (100%)	100 (100%)	100 (75%)				50 (100%)		100 (80%)
Red	450 (75%)	180 (100%)	90 (50%)	75 (100%)				550 (80%)	100 (50%)	500 (55%)

NOTE: FOR EXPLANATION OF FOOTNOTE, SEE PAGE 14.

Table 1 - Fishing Log of Deep-Water Trawling Exploration off the Coasts of Oregon and Washington, 1952 (Contd.)

DRAG NUMBER	11	12	13	14	15	16	17	18	19	20
Date	8/30/52	8/30/52	8/31/52	8/31/52	9/1/52	9/1/52	9/1/52	9/2/52	9/2/52	9/2/52
Latitude N.	45° 05.2'	45° 06.8'	45° 08.0'	45° 09.7'	45° 10.3'	45° 03.5'	45° 01.8'	45° 02.7'	45° 00.5'	44° 58.1'
Longitude W.	124° 49.8'	124° 53.0'	124° 55.0'	124° 34.3'	124° 27.8'	124° 39.1'	124° 34.0'	124° 37.0'	124° 38.0'	124° 35.0'
Loran Reading	2664	2661	2703	2722	2732	2846	2631	2659	2611	2582
Loran Reading	3360	3354	3392	3393	3406	3396	3390	3395	3381	3386
Sea	Mod. swell	Mod. swell	Mod. swell	Mod. swell	Mod. swell	Mod. swell	Mod. swell	Calm	Calm	Calm
Course, Magnetic	3590	0010	0610	1030	2160	3030	3250	3420	3430	2570
Depth Range in Fathoms	350-360	390-444	180-200	180	190-200	200	218-224	238-242	228-232	240
Type of Bottom	Mud & Rock	-	Mud	Rocky	Rocky	Mud	Mud	Mud	Mud	Gr. Mud
Trawling Bottom	Clear	Clear	Clear	Sag	Sag	Clear	Clear	Clear	Clear	Clear
Elapsed Time on Bottom	2 hrs.	1 hr.	2 hrs.	26 min.	1 hr.	2 hrs.	2 hrs.	2 hrs.	1 hr.	1 hr.
Estimated Total Catch in Pounds	1000	500	4000	200	500	1200	3000	3200	3200	400
Splice	None	None	None	None	None	One	None	None	None	None
Catch in Pounds (% Marketable)										
Flat Fish:										
Dover	Few (100%)	Few (100%)	1000 (70%)	100 (90%)	50 (80%)	1500 (85%)	1000 (85%)	1300 (80%)	1000 (80%)	Few (80%)
Petrale			* (1) (100%)	* (1) (100%)			50 (25%)	100 (50%)	100 (50%)	
Baz			50 (6%)	Few (100%)	Few (50%)	100 (50%)	80 (80%)			
Arrow-toothed Flounder (Turbot)			50 (70%)	Few (100%)	Few (100%)	100 (70%)				
Round Fish:										
Halibut	Few (100%)		100 (100%)	Few (100%)	100 (100%)	Few (100%)	Few (100%)	100 (100%)	100 (100%)	Few (100%)
Lingcod										
Follock										
Sablefish	600 (80%)	300 (80%)	100 (70%)	20 (50%)	50 (80%)	50 (90%)	200 (70%)	400 (65%)	300 (65%)	85 (80%)
Shark										
True Cod										
Rockfish:										
Black										
Pacific ocean perch			1000 (80%)		200 (95%)	2000 (95%)	1000 (95%)	900 (100%)	1000 (95%)	
Red	200 (25%)	150 (40%)	1300 (80%)	50 (100%)	50 (50%)	400 (100%)	600 (80%)	100 (75%)	300 (90%)	200 (100%)

NOTE: FOR EXPLANATION OF FOOTNOTE, SEE PAGE 14.

Table 1 - Fishing Log of Deep-Water Trawling Exploration off the Coasts of Oregon and Washington, 1952 (Contd.)

DRAG NUMBER	21	22	23	24	25	26	27	28	29	30
Date	9/3/52	9/3/52	9/3/52	9/4/52	9/4/52	9/4/52	9/4/52	9/4/52	9/4/52	9/10/52
Latitude N.	44° 52.5'	44° 54.3'	44° 56.0'	45° 17.6'	45° 16.2'	45° 16.2'	45° 12.2'	45° 12.2'	45° 12.0'	44° 57.8'
Longitude W.	124° 30.0'	124° 27.3'	124° 24.8'	124° 26.7'	124° 31.1'	124° 35.0'	124° 23.5'	124° 31.2'	124° 28.6'	124° 25.5'
Loran Reading	2515	2530	2560	2824	2801	2804	2755	2753	2754	2582
Loran Reading	3394	3400	3405	3411	3401	3393	3396	3400	3405	3407
Sea	Hyv. swell	Hyv. swell	Hyv. swell	Mod. swell	Mod. swell	Hyv. swell	Choppy	Mod. swell	Mod. swell	Mod. swell
Course, Magnetic	022°	022°	015°	336°	340°	291°	041°	045°	050°	339°
Depth Range in Fathoms	120-122	120	118-120	212	220-230	255	225-230	230	218	138-140
Type of Bottom	Mud	Mud	Mud	Mud	Mud	-	Mud	-	Mud	Mud
Trawling Bottom	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Bag	Clear	Clear
Elapsed Time on Bottom	1 hr.	1 hr.	1 hr.	1 hr.	2 hrs.	1 hr.	2 hrs.	1 hr.	1 hr.	1 hr.
Estimated Total Catch in Pounds	2500	3100	3500	1000	1800	400	1000	100	800	3400
Split	None	None	None	None	None	None	None	None	None	None
Catch in Pounds (± Marketable):										
Flat Fish:										
Dorser	800 (80%)	100 (80%)	400 (80%)	100 (85%)	100 (80%)	50 (85%)	Few (80%)	Few (90%)	150 (80%)	400 (85%)
Petrale	* (1) (100%)	* (1) (100%)		Few (20%)	55 (25%)	50 (80%)	Few (50%)	Few (50%)	Few (50%)	Few (25%)
Rox	50 (25%)	160 (80%)	200 (80%)							
Arrow-toothed Flounder (Turbot)	300 (100%)									
Round Fish:										
Halibut	Few (100%)	100 (100%)	50 (100%)	Few (100%)	Few (100%)	Few (100%)	Few (100%)	Few (100%)	Few (100%)	50 (100%)
Lingcod										
Pollack										
Sablefish	Few (50%)	100 (65%)	100 (80%)	100 (90%)	200 (90%)	100 (90%)	100 (75%)	Few (50%)	50 (80%)	100 (70%)
True Cod										
Rockfish:										
Black										
Pacific Ocean Perch	800 (95%)	2000 (95%)	2000 (95%)	350 (95%)	100 (95%)	Few (100%)	100 (95%)	25 (100%)	100 (95%)	2000 (95%)
Red	300 (85%)	300 (80%)	500 (85%)	250 (85%)	600 (75%)	40 (75%)	500 (95%)	25 (40%)	350 (75%)	500 (80%)

NOTE: FOR EXPLANATION OF FOOTNOTE, SEE PAGE 14.

Table 1 - Fishing Log of Deep-Water Trawling Exploration off the Coasts of Oregon and Washington, 1952 (Contd.)

DATE NUMBER	31	32	33	34	35	36	37	38	39	40
Date	9/10/52	9/11/52	9/11/52	9/11/52	9/11/52	9/11/52	9/12/52	9/17/52	9/17/52	9/24/52
Latitude N.	44° 54.5'	44° 57.7'	44° 59.5'	44° 56.8'	44° 58.8'	44° 57.0'	44° 51.2'	44° 46.3'	44° 46.0'	46° 45.0'
Longitude W.	124° 27.5'	124° 28.9'	124° 30.7'	124° 30.6'	124° 34.0'	124° 33.2'	124° 36.6'	124° 34.0'	124° 31.5'	130° 48.0'
Loran Reading	2564	2593	2600	2564	2594	2548	2495	2440	2435	318c
Loran Reading	3401	3388	3396	3395	3387	3389	3382	3384	3388	2050
Sea	Mod. swell	Mod. swell	Lt. swell	Lt. swell	Lt. swell	Calm	Mod. swell	hty. swell	hty. swell	Mod. swell
Course, Magnetic	348°	327°	159°	181°	172°	260°	310°	347°	345°	203°
Depth Range in Fathoms	170	200	220	220	240	240	198-202	120	102	110-112
Type of Bottom	Mud	Mud	Mud	Mud	Mud	Mud	Rocky	Mud	Mud	Rocky
Trawling Bottom	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Stag
Elapsed Time on Bottom	1 hr.	2 hrs.	1 hr.	1 hr.	1 hr.	1 hr.	1 hr.	1 hr.	1 hr.	3 min.
Retrieved Total Catch in Pounds	1800	2600	400	600	600	400	400	1200	3000	None
Splice	None	None	None	None	None	None	None	None	None	None
Catch in Pounds (✓ Marketable):										
Flat Fish:										
Dover	300 (90%)	400 (80%)	100 (75%)	100 (80%)	85 (80%)	100 (80%)	75 (100%)	75 (95%)	75 (95%)	P
Petrale										U
Rox		150 (40%)	Few (10%)	Few (25%)	50 (25%)	Few (20%)	Few (20%)	Few (15%)	Few (15%)	R
Arrow-toothed Flounder (Turbot)	125 (50%)	100 (80%)	Few (85%)	50 (100%)	40 (85%)	Few (75%)	Few (95%)	150 (95%)	150 (95%)	S
Round Fish:										Z
Hake										S
Lingcod										T
Pollack										R
Sablefish	200 (85%)	100 (75%)	75 (45%)	150 (75%)	100 (85%)	125 (90%)	50 (80%)	100 (85%)	100 (85%)	A
Shark										P
True Cod										B
Rockfish:										
Black										R
Pacific Ocean Perch	400 (95%)	500 (95%)	50 (95%)	150 (90%)						O
Red	500 (90%)	1000 (85%)	150 (70%)	100 (80%)	200 (60%)	100 (75%)	200 (75%)	500 (75%)	500 (75%)	K

NOTE: FOR EXPLANATION OF FOOTNOTE, SEE PAGE 14.

Table 1 - Fishing Log of Deep-Water Trawling Exploration off the Coasts of Oregon and Washington, 1952 (Contd.)

DATE NUMBER	L1	L2	L3	L4	L5	L6	L7	L8
Date	9/25/52	9/25/52	9/26/52	9/26/52	9/26/52	9/27/52	9/27/52	9/27/52
Latitude N.	47° 32.6'	47° 29.4'	47° 30.2'	47° 32.2'	47° 33.1'	47° 36.1'	47° 31.2'	47° 31.2'
Longitude W.	125° 12.0'	125° 11.0'	125° 09.5'	125° 08.9'	125° 03.7'	125° 02.5'	124° 57.4'	125° 02.0'
Loran Reading	284	4156	3102	4177	4210	4209	4215	4203
Loran Reading	285	3070	3099	3086	3070	3101	3164	3110
Sea	Mod. swell	Mod. swell	Slight swell	Mod. chop	Mod. swell	Mod. swell	Lt. swell	Mod. swell
Course, Magnetic	158°	170°	071°	087°	136°	123°	307°	307°
Depth Range in Fathoms	306-309	304-308	302-310	261	100	100	100	120
Type of Bottom	Mud	Mud	Coral-Mud	Rocky	Sand-Gravel	Rocky	Rocky	Rocky
Trawling bottom	Clear	Clear	Snag	Snag	Clear	Snag	Snag	Snag
Elapsed Time on Bottom	1 hr.	1 hr.	1 hr.	1 hr.	1 hr.	5 min.	1 hr.	10 min.
Estimated Total Catch in Pounds	400	500	400	None	2500	325	500	None
Splice	None	None	None	None	None	None	None	None
Catch in Pounds (% Marketable):								
Flat Fish:								
Hake								
Lingcod								
Pollock								
Sablefish								
Shark								
True Cod								
Round Fish:								
Hake								
Lingcod								
Pollock								
Sablefish								
Shark								
True Cod								
Rockfish:								
Black								
Pacific Ocean Perch								
Red								
	150 (20%)	180 (25%)	200 (20%)		1000 (95%)	200 (95%)	300 (95%)	
					200 (65%)	100 (35%)	100 (45%)	

* BRACKETED FIGURES INDICATE NUMBER OF FISH INSTEAD OF POUNDS.

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CONSUMERS' CANNED FISH PREFERENCES

Canned salmon, for many years the number one choice of consumers of canned fish in the United States, still held the lead in consumer preference as recently as 1951. This was found in a national consumer survey (Fish and Shellfish Preferences of Household Consumers) conducted during that year by the U. S. Fish and Wildlife Service. Nearly 63 percent of those contacted in the survey mentioned salmon when asked what kind of canned fish they served. Tuna, nearly as popular, was named by 56 percent. Sardines (13 percent) and mackerel (2 percent) fell far behind the two leading varieties.



The regional pattern of preferences for canned fish was surprisingly varied. The people in areas with a high proportion of rural families had a definite preference for salmon, whereas areas with higher urban populations preferred canned tuna. An example of this was found in comparing the survey findings in the South with those in the Northeast. In the South, which is considered basically rural, salmon was preferred over tuna by a ratio of 2 to 1 (73 percent used salmon, while 36 percent used tuna). In the Northeast, an area with a large urban population, 76 percent of the consumers used tuna, compared to 55 percent who said they served salmon. Use of sardines appeared to follow somewhat the same area pattern as salmon, with the largest percentage of sardine users found in the South, and the smallest percentage found in the Northeast.

In the West, which accounts for most of the production of salmon, tuna, and sardines, it was noted that tuna took first place in consumers' preference by a wide margin. Almost 70 percent of the consumers in this area used tuna, but only 46 percent reported buying salmon. In the Midwest area, the situation was reversed, since almost 70 percent used salmon but only 50 percent used tuna.

Part I--National Summary (FL-407) and Part II--Regional Summary (FL-408) of the series Fish and Shellfish Preferences of Household Consumers--1951 are available free upon request from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.



Progress on Projects, September 1953

REFRIGERATION: Freezing Fish at Sea, Defrosting, Filleting, and Refreezing the Fillets: **VESSEL:** Two attempts were made by the research trawler Delaware to carry out full-scale fishing and freezing fish at sea operations. After about 16,500 pounds of haddock had been caught and brine-frozen, the first of these test cruises (Cruise No. 22, completed August 24) was interrupted due to difficulties with the ammonia pumps of the refrigerating equipment. The catch from the 5-day cruise consisted of 14,000 pounds of scrod haddock and 2,500 pounds of large haddock. These fish were caught and frozen during about one day of round-the-clock fishing and freezing operations. Two types of chutes, both still in the experimental stage, for moving the frozen fish from the freezer tank to the frozen storage holds were tested. Results obtained with the chutes were quite favorable.

After 44,000 pounds of groundfish had been caught and brine-frozen, the second of these cruises was terminated September 4 due to the jamming of the elevator chains of the brine-freezer mechanism. Fishing took place on Western Bank in the area of Sable Island. The catch on this 9-day cruise consisted of 25,000 pounds of scrod haddock, 14,000 pounds of large haddock, 4,000 pounds of cod, and 1,000 pounds of pollock. The haddock and scrod haddock were sold over the New England Fish Exchange to fillet processors, while the cod and pollock were stored in commercial cold storage by the laboratory for obtaining data on the cold-storage characteristics of these fish.

During the month the ammonia pumps were repaired and the elevator chains revised to eliminate the difficulties experienced during full-scale continuous operation. Also, additional fuel tanks on the vessel were placed in good condition so as to permit longer test cruises and extended periods of fishing.

(Boston)

BYPRODUCTS: Vitamin Content and Nutritive Value of Fishery Byproducts: Analyses were made of 23 samples of menhaden meal for riboflavin content. The results were:

Meal	Number of Samples	Riboflavin (micrograms per gram, as received)		
		Maximum	Minimum	Average
Menhaden	23	5.8	2.0	3.2

One sample of crab meal showed 11.9 micrograms of riboflavin per gram of meal, as received.

NUTRITION: Discoloration in Canned Tuna: The technologist assigned to the project visited the plant and laboratory in Chicago of the can company sponsoring the project to obtain basic information on the manufacture of cans and can enamels, and for current data on the problem of discoloration in canned tuna. A trip was also made on a commercial tuna fishing vessel operating out of a California port. Samples of albacore tuna were ob-

tained for the preparation of experimental canned packs. The samples of raw fish will be handled and treated in various ways in an attempt to determine the conditions that lead to sulfide discoloration after canning.

(Seattle)

* * * * *

ANALYSIS AND COMPOSITION: Composition of Fish: The proximate composition of individual samples of sheepshead (*Aplodinotus grunniens*) from various areas and of squawfish (*Ptychocheilus grandis*) from the Columbia River was determined. A detailed study is being made of the variation in composition of sheepshead from different areas and for different seasons of the year. The results are as follows:

Composition and Fillet Yield of Sheepshead Caught in Clearwater Lake, Minnesota, May 1953							
Sample Number	Length	Weight	Fillet Yield	Proximate Composition of the Edible Portion			
				Moisture	Fat	Protein	Ash
	Cm.	Grams	Percent	(Percent)			
1	25.0	140	28.9	83.4	0.74	15.6	0.96
2	24.5	135	29.6	83.3	0.90	15.7	1.02
3	24.5	145	24.1	82.5	1.20	15.9	1.15
4	26.0	145	24.1	83.3	1.17	15.9	1.00
5	25.5	150	30.0	82.5	1.21	16.7	1.05
6	24.5	145	32.1	83.5	1.47	15.6	1.08
7	26.0	165	39.4	82.4	0.80	16.1	1.06
8	28.0	205	31.7	83.2	0.92	16.4	1.07
9	28.0	200	32.5	81.8	1.00	16.4	1.13
10	27.5	210	23.8	82.5	1.24	16.7	1.05
11	26.5	175	40.0	82.5	1.14	16.4	1.03
12	28.5	235	29.7	82.4	0.83	16.6	1.15
13	28.5	215	32.5	82.2	0.72	16.1	1.10
14	29.0	225	29.0	83.1	0.72	15.7	1.02
15	33.0	325	29.0	81.8	1.67	17.0	1.05
16	28.5	265	24.5	83.0	0.90	16.1	1.15

Composition of Sheepshead (Edible Portion) Caught in Lake Winnebago, Wisconsin, July 1953.							
Sample Number	Length	Weight	Proximate Composition of Edible Portion				
			Moisture	Fat	Protein	Ash	
	Cm.	Grams	(Percent)				
1	37.0	425	82.6	1.23	15.5	1.00	
2	36.0	460	84.3	0.71	15.6	0.95	
3	39.5	575	82.1	1.79	16.7	1.04	
4	39.0	525	83.3	0.89	14.8	1.00	
5	38.0	570	82.6	1.20	16.3	1.00	
6	36.5	520	81.4	2.00	17.1	0.90	
7	33.5	525	70.3	15.3	14.9	1.14	
8	36.0	475	81.3	1.91	17.0	0.98	
9	35.0	390	82.5	1.33	16.1	1.03	
10	33.0	455	75.7	9.8	15.3	0.91	
11	34.0	470	82.5	2.33	16.2	0.94	
12	35.0	425	82.7	1.00	17.0	1.07	
13	48.5	1330	82.7	1.71	15.7	1.00	
14	42.5	665	84.6	0.56	14.5	0.97	
15	38.0	640	82.7	1.15	16.1	0.95	
16	37.0	555	83.3	0.64	15.6	1.05	

Composition of Sheepshead (Edible Portion) Caught in the Mississippi River, May 1953						
Sample Number	Length Cm.	Weight Grams	Proximate Composition of Edible Portion			
			Moisture Percent	Fat Percent	Protein Percent	Ash Percent
1	31.5	395	76.0	4.75	18.1	1.15
2	29.5	325	75.4	5.36	18.1	1.15
4	27.5	255	79.4	1.45	17.9	1.12
5	33.0	420	72.5	9.08	16.9	1/
6	31.5	435	73.6	7.30	17.6	1/
7	33.0	425	74.8	8.58	17.1	1/
1/ANALYSIS NOT YET FINISHED.						

Composition of Squawfish (Edible Portion) Caught in the Columbia River, June 1953									
Size Class of Fish	No. of Fish in Sample Group	Length			Avg. Weight Grams	Proximate Composition of Edible Portion			
		Avg.	Min.	Max.		Moisture	Fat	Protein	Ash
		Cm.	Cm.	Cm.		Percent	Percent	Percent	Percent
Small	16	24.5	22	28	186	80.1	1.76	15.6	1.06
Medium	9	32.5	31	35	353	79.0	3.06	17.3	0.97
Large	8	36.9	34	40	548	78.8	2.41	18.0	1.07
Mixed	33	29.8	22	40	319	79.3	2.83	17.1	1.13



CANNED TUNA GOLDEN ANNIVERSARY

National Tuna Week will be celebrated November 5 to 14, the 50th Anniversary of the tuna canning industry.



Fifty years ago the tuna industry consisted of one cannery in San Pedro, California, supplied by a few boats fishing in nearby waters. Thus originated the industry that has made available the canned tuna now so abundant in our food markets.

For versatility, canned tuna wins the home-maker's vote every time whether it's a full-fledged meal for the whole family or a quick snack for hungry youngsters. Protein-rich tuna is the perfect ingredient for many types of dishes. Nutritious salads and cold-weather casseroles are easily made and in short order when several cans of this fine food are handy on your kitchen shelf.

For a quick snack that the children will love, the home economists of the Fish and Wildlife Service suggest a Tuna Waldorf Salad.

TUNA WALDORF SALAD

2 7-OUNCE CANS TUNA
1 CUP DICED APPLES
1/2 CUP MAYONNAISE OR SALAD DRESSING
1/2 CUP CHOPPED CELERY
1/4 CUP CHOPPED NUTS

Drain tuna and flake. Combine all ingredients, being careful not to break fish into pieces too small; chill. Serve in lettuce cups with a bright-colored garnish. Serves 6.

PROGRESS ON FISHERY TECHNOLOGICAL RESEARCH PROJECTS, FISCAL YEAR 1953

A discussion of the Fishery Technological Research Program for fiscal year 1952 (July 1, 1951, to June 30, 1952) appeared in the November 1951 Supplement of Commercial Fisheries Review, vol. 13, No. 11a, pp. 2-7 (also reprinted as Separate 294). A review of the progress made in each project during fiscal year 1952 appeared in the December 1952 Supplement of Commercial Fisheries Review, vol. 14, No. 12a, pp. 1-7 (Separate 327). The program for fiscal year 1952 was continued for fiscal year 1953 (July 1, 1952, to June 30, 1953). New projects were added during the year as the old ones were completed or as the need for specific information arose. Progress on each project from July 1, 1952, to June 30, 1953, was as follows:

REFRIGERATION

FREEZING FISH AT SEA, DEFROSTING, FILLETING, AND REFREEZING THE FILLETS: Fishing Operations and Overhaul of the "Delaware:" Cruises during the summer and fall of 1952 permitted thorough testing of the freezing and cold-storage facilities on the Delaware. Fish were supplied for pilot-plant, laboratory and storage studies, and other phases of the project. Round fish brine frozen at sea were landed at the Boston Fish Pier and sold to producers for commercial processing into fillets.

The Delaware was drydocked and placed in good operating condition. A ventilator was installed on the main deck aft and forward of the trawl winch to supply fresh air to the refrigeration machinery room.

Freezing and Storage of Fish Aboard the "Delaware:" Results of modifications in the experimental refrigeration plant and fish-freezing equipment, and expansion of the cold-storage hold were observed during the seven test cruises conducted from June to October 1952. Recent alterations to the brine cooler are expected to increase the fish-freezing capacity from 550 pounds to about 1,200 pounds an hour.

A new type freezer mechanism is now under construction and has been designed to (a) permit the loading and unloading of the freezer at deck level, (b) increase freezer capacity 50 percent, and (c) increase cold-storage capacity in the hold.

Unloading, Storing, and Processing Ashore: Some progress was made in developing methods for unloading the vessel and handling brine-frozen fish. Procedures normally employed at Boston for unloading iced fish were modified slightly to provide a partially satisfactory method for unloading frozen fish. From the dock into the cold-storage plant the frozen fish were moved in boxes (of a variety of sizes), on four-wheel hand trucks. Experiments with mechanical conveyors and self-unloading boxes for making these operations more expeditious are contemplated.

Large lots (5 to 10 tons) of brine-frozen haddock were held in commercial cold storage and removed at intervals to determine the effect of such storage on the subsequent handling of the fish and the quality of fillets produced therefrom. Improvements in the preparation or storage procedures, such as glazing or other means of preventing desiccation, appear to be desirable before storage periods longer than two months can be recommended for frozen haddock held in the round.

Defrosting methods whereby the fish were held in circulating water at 60° F. or lower were found to be very satisfactory. Detailed technical information on thawing methods and equipment were made available to the industry.

Laboratory Tests: The various lots of frozen fillets prepared from round brine-frozen and iced gutted haddock landed by the Delaware have been evaluated for quality by taste panel, chemical, and physical testing. Results of tests made on haddock fillets held for 12 months in frozen storage showed no appreciable differences between the quality of the fillets prepared from round brine-frozen fish and those from iced gutted fish. A consumer taste panel composed of about 125 families in the Boston area has been par-

ticipating in a number of tests with various lots of fillets from brine-frozen and iced gutted fish. The fillets, identified only by a code unknown to the panel members, are cooked and served in the home by the housewife. On the basis of several such tests, the results indicate that fillets from round brine-frozen haddock are at least equally as acceptable as those from iced gutted haddock, and in some instances there might be a slight preference for the fillets from the brine-frozen fish.

Tests of various solutions for attaining immersion-freezing temperatures of about -15°F . showed some promise. The suitability of such solutions is limited (1) by the necessity of meeting certain acceptability requirements for food and (2) the need for obtaining certain physical properties with existing freezing equipment aboard the vessel.

Comprehensive tests to determine the degree of salt penetration into the meat of haddock during freezing in brine at various temperatures and brine concentrations are well under way. Tests are also in progress to determine the effect on weight, salt uptake, and drip of fillets dipped in brine solutions of various concentrations. This information is particularly desirable in connection with fillets that have been prepared from brine-frozen fish and which might contain slightly more salt than those from iced fish.

FREEZING AND STORING ALASKA SHRIMP AND DUNGENESS CRAB MEAT:
Alaska Shrimp: Storage tests of frozen precooked shrimp were completed. The effects of brine-cooking procedures, packaging methods, and storage temperatures at 0°F . and 10°F . on the keeping quality were determined. Emphasis was given to those factors responsible for toughening of the shrimp during the preparation and storage. Significant conclusions were: (1) the texture of precooked pink shrimp varied widely in any given lot processed under uniform conditions; (2) use of minimum cooking time and low salt concentration in the brine precook process resulted in superior texture and minimum shrinkage of the meats; recommended precook is 1 minute in 5-percent brine by weight; (3) keeping quality was improved markedly by flooding the shrimp with dilute brine (2 percent by weight) or by vacuum packing (18 to 20 inches of vacuum) in hermetically-sealed containers (storage life under these conditions was longer than 8 months at 0°F .); (4) use of 0.3 percent dry monosodium glutamate in dry-packed shrimp meat did not improve keeping quality.

Dungeness Crab Meat: Storage tests are in progress on the effect of storage temperature and packaging methods on keeping quality of the frozen meat. Samples have been examined at intervals during 6 months of storage. The highest quality packs with a storage life greater than 6 months were: (1) crab meat flooded with dilute brine (2 percent salt by weight) packed in sealed cans and stored at 0°F .; (2) vacuum-packed (18 to 20 inches of vacuum) crab meat in cans stored at -20°F .; (3) vacuum-packed crab meat in cans stored at 0°F . Crab meat packed in cans under atmospheric pressure or in plastic containers and stored at 0°F . was of inferior quality and had a storage life of less than 6 months.

Frozen Shrimp Cocktail: Tests are in progress on the keeping quality of frozen shrimp cocktail packed in hermetically-sealed cans stored at 0°F .

PREPARATION OF MANUAL ON THE REFRIGERATION OF FISH: The protracted illness of the original project leader caused considerable delay in the laying of the groundwork for the manual. His death necessitated the reassignment of the project. Advantage was taken, however, of this reassignment to reappraise the scope and coverage of the manual in the light of the information collected by the original project leader. Subsequently an entirely revised and more detailed outline of the subject matter to be included was prepared and circulated to a number of industry's fish refrigeration specialists for their comments and suggestions. The many helpful comments received were incorporated. The preparation of material for the manual on the refrigeration of fish is going forward along the lines indicated as most needed and acceptable to the fish-refrigeration industry.

EFFECT OF STORAGE CONDITIONS ON QUALITY OF FROZEN FISH: No work was carried out on this project. The project was completed during the last fiscal year except for the final phase involving commercial-scale tests. This experiment would require large quantities of fish and it was planned to use any tuna landed by the Service's exploratory vessel John N. Cobb. Due to poor fishing conditions, sufficient fish were not landed to carry out the experiments.

QUALITY STANDARDS FOR HADDOCK FILLETS: This project was initiated during the latter part of the fiscal year to set up criteria for comparing the quality of haddock fillets prepared from fish frozen at sea with commercially-processed fillets prepared from fish iced at sea. No work was carried out during the fiscal year on this project.

STUDY OF CAUSE OF TEXTURE CHANGE OF CANNED SALMON PREPARED FROM FROZEN FISH: Studies have shown that the physical destruction of the cell walls of the meat of salmon during freezing and storage is at least partially responsible for the toughening of the product on subsequent canning. Excessive curd formation on canning does not appear to be caused by the physical changes during freezing, but does appear to be related to a chemical change in the meat protein which releases the soluble protein fraction causing the formation of a proteinaceous curd during heat processing. Studies have been started on this latter problem.

Tests with the pretreatment of the cut sections from thawed salmon have shown that curd formation during subsequent heat processing may be minimized by dipping the sections one minute either in saturated NaCl brine or a 5-percent solution of tartaric acid. The acid treatment was more effective in these tests. Analysis of canned salmon treated with tartaric acid showed that the product contained 0.03 percent by weight of tartaric acid.

METHODS OF PRESERVING AND FREEZING SHRIMP ASHORE AND AT SEA IN THE GULF OF MEXICO: Limited tests were conducted at sea and ashore in the Gulf of Mexico to study methods of handling and freezing shrimp. Whole shrimp and shrimp tails were frozen at sea in refrigerated brine (5° F. to 10° F.) and placed in cold storage at 0° F. Frozen whole shrimp were thawed ashore, headed, packaged, and refrozen. All frozen packaged shrimp were glazed. Comparisons of brine-frozen, refrozen, and air-frozen shrimp tails were made during 9 months of storage at 0° F. The results indicate: (1) brine-frozen shrimp which were later thawed, headed, packaged, and refrozen had excellent appearance, flavor, and texture during 9 months of storage; (2) shrimp (brine- or air-frozen at sea immediately after catching) were free of any black-spot discoloration; (3) no excessive salt absorption was found in fresh whole shrimp frozen in brine at 10° F. for periods less than 4 hours; (4) absorption of salt increased when shrimp were held in refrigerated brine for periods longer than 4 hours; (5) salt absorption was significantly higher in iced shrimp frozen in brine as compared to shrimp frozen in brine immediately after catching; (6) the most important factor causing loss in quality of frozen packaged shrimp during storage was dehydration of surface shrimp after the ice glaze evaporated at the corners and edges of the package.

COLD-STORAGE LIFE OF HALIBUT: The cold-storage life of halibut stored as dressed (heads off) and as steaks is being determined as a guide to possible future modification of Federal Specifications. After 9 months of storage at 0° F., halibut stored as dressed fish were superior in quality to those stored as steaks. Steaks sliced from dressed halibut that were stored for 6 months at 0° F. were layer-packed in cartons and then stored at various temperatures for an additional 3 months. The samples stored at 20° F. were rated unacceptable; the steaks stored at 0° F., -15° F., and -20° F. were rated acceptable, with the steaks stored at -20° F. showing the least change in flavor.

COLD-STORAGE LIFE OF KING AND SILVER SALMON: Studies in connection with Federal Specification requirements showed that dressed chinook and silver salmon which were frozen, ice-glazed, stored at 0° F., and reglazed at 3-month intervals were still of good quality after six months of storage. Steaks cut from similar fish immediately after freezing when ice-glazed and stored in institutional size wax paper-lined cartons, passed out of the top quality range at the end of 6 months.

FREEZING, GLAZING, AND THAWING SALMON TO BE CANNED: Studies were made on the feasibility of glazing brine-frozen salmon and on the effect of different thawing technics on the quality of the pack of canned salmon resulting therefrom.

The salt absorbed by brine-frozen fish interferes with successful ice glazing at the storage temperatures commonly used commercially (0° F. to 10° F.). The glaze taken by brine-frozen Alaska red salmon at 0° F. was not considered satisfactory; however, the glaze taken at -20° F. was good. Since glazing of the brine-frozen salmon does not appear feasible at the storage temperatures now used by the freezer ships (about 5° F.), these fish will be more susceptible to dehydration and oxidative deterioration upon pro-

longed storage. Therefore, it is highly important to process these fish as soon after freezing as possible in order to have a good quality canned product.

In order to compensate for the salt absorbed during brine freezing it was necessary to reduce the amount of salt added to each can up to as much as 50 percent of the amount normally added to cans packed from fresh salmon. Different thawing methods--in running water, in still water, or in air--did not affect the quality of the canned fish.

NUTRITION

INVESTIGATION OF THE TOUGHENING OF FROZEN BLUE CRAB MEAT: Practically no work was done on the problem of identifying the enzymes which may be involved in the change of texture of frozen crab meat because a research fellowship student could not be obtained.

FEEDING STUDIES WITH GUMS EXTRACTED FROM IRISH MOSS: Gums are being extracted commercially from Irish moss, and derivatives of these are being used in foods and pharmaceutical preparations. Rats and mice have been allotted to 5 comparable groups and are fed a balanced ration to which has been added 0, 1, 5, 15, and 25 percent gum. The animals have now been on experiment for about two years. It is expected that the experiment will be concluded during the summer or early fall of the coming year. The data to date indicate that the product is wholesome.

CHEMICAL AND PHYSICAL PROPERTIES OF FISH AND SHELLFISH PROTEINS: A fundamental study of the water retentivity of the meat of fish, with particular reference to the mechanism of drip formation in frozen fish, is being continued. It was found that the concentration of nitrogen in the drip from rockfish stored at 0° F. varied inversely with storage time. The drip produced by gravity was a more sensitive measure of the changes occurring in the fish during frozen storage than was the fluid produced by centrifugation. The studies indicate that ground fish can be used in place of whole fish pieces in drip studies, with a gain not only in the homogeneity of the material but also in the sensitivity of the measurements. Considerable information was obtained on the characteristics of drip formation under various temperature and physical conditions.

THIAMINASE CONTENT OF CERTAIN SPECIES OF FISH USED IN FEEDING FUR ANIMALS: Samples of fillet waste from cod, sole, and rockfish, and cannery waste from the various salmon were found to contain negligible amounts of the enzyme thiaminase. The project was terminated during the early part of the fiscal year.

A STUDY TO DETERMINE THE COMPARATIVE HEMOPOIETIC VALUE OF FISH: An 8-week metabolism study was conducted during the fall in cooperation with the College of Home Economics of the University of Maryland. A group of 10 girls consumed a basal diet low in protein and adequate in vitamins, minerals, and calories. Five girls received a daily allowance of animal protein in the form of haddock fillets and the other five received theirs in the form of sirloin of beef. Blood samples were taken every 2 weeks. During the year, analyses of protein, fat, ash, and iron have been conducted on the samples of foods, urine, and feces collected in this metabolism trial or the one that was conducted year before last. Two master-of-science-degree theses on this work were published during the year. The work will continue during the coming year.

DEVELOPMENT OF SPECIALTY FOOD PRODUCTS FROM ALASKA FISH AND EDIBLE PORTIONS OF FISH WASTE: Development work has been concluded on the preparation of a pasteurized smoked salmon egg spread; canned, smoked, and pickled her-ring specialty products; canned smoked butter clams, and canned smoked shrimp. Storage tests of inoculated packs of salmon egg spread are in progress at the National Canners Association Laboratory, Berkeley, California, in order to determine whether the product may be stored safely at room temperature. Preliminary tests were made on the utilization of Alaska whitefish. Studies are in progress on the preparation of a canned smoked spread from frozen chum salmon and pink salmon trimmings (edible portions from salmon cannery waste).

ANALYSIS AND COMPOSITION

CHEMICAL COMPOSITION OF FISH: (1) Menhaden: No work was carried out on this project during the fiscal year.

COOPERATIVE WORK WITH THE AOAC ON THE DETERMINATION OF OIL IN FISH MEAL: Some preliminary work has indicated that the rapid acid hydrolysis--Mojonnier tube method--which works well for the meat of fish may (by suitable modification in the hydrolysis procedure) be adaptable to fish meal. Previous tests had indicated that only a part of the oil could be recovered from fish meal by this method. Work is continuing on the modification of the hydrolysis step to see whether this simple procedure can be applied to fish meal.

COMPOSITION AND COLD-STORAGE LIFE OF FRESH-WATER FISH: Proximate chemical composition of the edible portion and waste have been determined for blue pike, yellow pike, yellow perch, whitefish, and sheepshead from Lake Erie; chub and smelt from Lake Michigan; lake trout from Lake Superior; carp, buffalofish, and sheepshead from the Mississippi River; and carp and bullhead from a small lake.

Samples of the frozen fresh-water fish were placed in cold storage to determine their keeping qualities at 0° F. Blue pike, yellow pike, yellow perch, whitefish, and sheepshead showed some deterioration in quality by the end of the 12-months' storage period; however, all species were judged edible. Lake Michigan smelt and Columbia River smelt had cold-storage life of 6 to 7 months and 3 to 6 months, respectively; both developed off-flavors in the belly flaps after 3 months of storage. The keeping quality of lake trout fillets varied considerably; one fillet was inedible after 3-months' storage whereas other fillets were still acceptable after 8-months' storage.

BYPRODUCTS

VITAMIN CONTENT AND NUTRITIVE VALUE OF FISHERY BYPRODUCTS: Experiments on the Unidentified Growth Factor(s) in Fish: Laboratory procedures have been established for the preparation of fish-liver concentrates containing the growth factor. A microbiological assay has been developed which permits rapid measurement of this growth factor. Studies now under way are directed at correlating the growth response as measured microbiologically with that measured by rat assay. Experiments also are being carried out with the object of obtaining the growth factor in pure crystalline form.

Vitamin Analyses: Twenty-three samples (600 bags each) of pilchard meal were analyzed. On a moisture-free and oil-free basis the average for niacin was 84 micrograms per gram and for vitamin B₁₂, 0.27. Twenty-one samples of individual bags of tuna meal averaged 0.33 micrograms of vitamin B₁₂ per gram of meal. These tuna meal samples are being analyzed for their riboflavin and niacin content. Meals prepared from menhaden, anchovy, whale loins, mackerel, mackerel offal, herring, and crab were also assayed.

Biological Assays and Evaluation: a. During the previous year a number of assays with chicks were conducted to determine the vitamin B₁₂ content of fish meals and fish solubles. The Seattle laboratory completed the microbiological assay on the same samples during this year. A limited number of reassays will be conducted during the coming year to determine causes of differences noted. Some bioassays of the dried solubles products are contemplated during the coming year.

b. Due to the relatively large amounts of fish oils available and the comparatively low market value, feeding tests were conducted with broilers to determine the feasibility of adding these oils to commercial poultry and swine feeds. The first series of experiments indicated that menhaden oil could be fed at levels of 2 to 8 percent without adversely affecting the health, feathering, or color of skin and shanks of the birds. Even the lowest level fed, however, gave a fishy flavor to the meat so it could not be recommended. A second series of experiments is now under way feeding oil from 0 to 2 percent by $\frac{1}{2}$ percent increments. The results should indicate conservative levels which may be fed without affecting the flavor of the meat.

c. A limited number of meals and condensed fish solubles were fed late last year to chicks to determine the nutritive value of the protein. Variable results were obtained which could not be correlated with known differences in raw materials or the processing methods used. More extensive tests are expected to be carried out on this project during the coming year.

UTILIZATION OF VISCERA FROM ROUND (WHOLE) FISH FROZEN AT SEA:
No work was done on this product due to the shortage of laboratory personnel.

STUDY OF PHARMACEUTICAL AND OTHER INDUSTRIAL PRODUCTS FROM SALMON EGGS: Amino Acid Content of Salmon Egg Protein: The "essential" amino acid content of roe at different stages of maturity from the five species of Pacific salmon has been determined by microbiological-assay methods. The distribution of amino acids in the roe was generally uniform, being significantly altered only by maturity. Most of the amino acids were present in increasing quantities with increasing maturity. The average amino-acid content of mature roe from the five species of salmon in percentage of protein was: arginine 7.1; histidine 2.8; isoleucine 7.3; leucine 10.0; lysine 8.8; methionine 2.9; phenylalanine 4.9; threonine 5.9; tryptophane 1.0; and valine 7.3. A preliminary report has been submitted for publication.

The Fatty Acids of Salmon-Egg Oils: The long chain of unsaturated fatty acids present in salmon-egg oil have considerable promise for specialized applications, but basic information is lacking on the fatty acid fractions. A study of salmon-egg oil has been initiated with particular emphasis on the unsaturated fraction.

DEVELOPMENT OF A DRIED PRODUCT FROM CONDENSED MENHADEN SOLUBLES OR STICKWATER: This project has three interlocking phases: (a) sample collection, (b) analysis of solubles, and (c) preparation and a chemical-physical study of dry "solubles." The field work, determined by the seasonal nature of the fishery, was made as extensive as possible because of the wide variability in the solubles produced from different plants, by different equipment, and in different areas. Eventually, samples were obtained from all but two of the 20 plants which produced solubles during the 1952 season.

The analytical work on the solubles supplied background information (completely lacking in the literature) on the physical and chemical properties of the product. This information was essential to the evaluation of the third phase--the preparation of a satisfactory dry product from solubles.

A pilot-plant-size drum dryer, with 6 x 6 inch drum, was ordered in July 1952, but delivery was not made until January 1953. Thus less than six weeks were available for the actual study of the drying operation. In this time, 24 dry samples have been prepared. These include a straight run of almost all of the soluble samples on hand. These dry samples are now being studied as to composition, and especially their hygroscopic properties. It is expected that differences in both the behavior in the drying operation and in water absorption can be related to other properties of the solubles, and that some correlations may be found which will aid in the ultimate object of explaining and controlling the principal difficulty in producing a satisfactory product, namely, excessive hygroscopicity of the dry material.



PROGRAM FOR FISHERY TECHNOLOGICAL RESEARCH, FISCAL YEAR 1954

The program for fishery technological research for Fiscal Year 1954 (July 1, 1953, to June 30, 1954) was developed on the basis of recommendations from members of the fishing industry. When the amount of funds allotted to the Section was known, the assignment of projects was made after taking into consideration the location, facilities, and personnel at each of the four technological laboratories. For ready reference all projects assigned for Fiscal Year 1954 are listed by general field of study.

NUTRITION

1. Investigation of the Toughening of Frozen Blue-Crab Meat (cooperative project sponsored by the Refrigeration Research Foundation)--continued project: Practically no work was done last year on the problem of identifying the enzymes which may be involved in the change of texture of frozen crab meat because a research fellowship student could not be obtained. The project will be activated as soon as a fellow is available. A technologist will supervise a graduate student on this project. (College Park)

2. Chemical and Physical Properties of Fish and Shellfish Proteins (continued project): This study is directed toward providing basic information on the toughening of fish and shellfish in cold storage, the nature and control of drip in frozen fish, and the nature of the chemical and physical changes which occur in dried or dehydrated fish and in fish meal. This information might lead to methods of control of undesirable changes and eventually to the improvement in the quality of fishery food products. The phase of the project to be considered during this year will be the mechanism of drip formation in fish and shellfish. A study of the drip formed on cooking will also be included. The work will be carried out on a part-time basis by one technologist. (Seattle)

3. Determination of Chemical Changes in Fish Protein during Freezing and Storage (new project): When fish are frozen certain changes take place that may not be attributable entirely to physical reactions. The study will attempt to reveal any chemical change that takes place in the fish protein and to apply the results toward methods of improving the quality of frozen fishery products. The study will require the full time of one technologist. (Ketchikan)

4. Comparison of Nutritive Value of Fish and Meat (continued project): The University of Maryland, College of Home Economics, in a cooperative project, compared haddock fillets with sirloin of beef as the animal protein in test diets consumed by two groups of girls. This study is expected to be continued with some additional stress on the calorific values as measured by an improved laboratory procedure. One technologist supervises a graduate fellowship student conducting these studies. (College Park)

5. Discoloration in Canned Tuna (cooperative project sponsored by the Continental Can Company)--new project: Cans used for packing tuna require a special enameling process to prevent inner-surface can discoloration. A study will be made of the mechanism of this discoloration reaction. Application of the information obtained may result in less expensive preventive measures. The project will be carried out by one fellowship student on a part-time basis. (Seattle)

REFRIGERATION

1. Freezing Fish at Sea, Defrosting, Filleting, and Refreezing the Fillets (continued project): The freezing-fish-at-sea project has as its objectives: (1) raising the over-all quality level of frozen fillets to meet the competition of other animal protein foods and of other countries marketing fish in this country; and (2) extending the effective range of our vessels to more distant but less depleted fishing areas. Activities on the project have included: (1) The modification of a standard New England trawler for commercial-scale freezing experiments at sea. (2) The development, installation, and testing of round-fish freezing equipment and techniques adopted to existing vessels and crews. (3) The development and testing of acceptable defrosting equipment and procedures.

(4) The study of the cold-storage life of round fish frozen at sea prior to filleting, and of refrozen fillets from these stored round frozen fish. (5) Laboratory and consumer acceptance tests of fillets from fish frozen at sea compared to those from iced fish.

Haddock was the principal species used in this development work. In this fiscal year the economic aspects of freezing fish at sea will be evaluated as compared to the current New England iced-vessel type of operation, again using haddock. Thereafter similar tests are contemplated using the same or suitably modified techniques to obtain information on other important New England species, such as cod, flounder, and ocean perch. Personnel assigned to this project include the fishing vessel complement, one full-time technologist, and the part-time services of two technologists, one chemist, and one refrigeration engineer. (Boston)

2. Quality Standards for Haddock Fillets (continued project): The quality standards for haddock fillets in use in the industry were developed largely for fillets from fish preserved at sea in ice. Early in the study of fillets from round haddock frozen at sea, variances not found in fillets from iced fish were observed. On this project information will be obtained essential to the preparation of quality standards for haddock fillets prepared from iced fish (sold either as fresh or frozen fillets) and from frozen round fish (sold as frozen fillets). The availability of fish of known history for this work from the Delaware makes this a logical study to supplement the freezing-fish-at-sea project. One technologist will work part time on this project. (Boston)

3. Preparation of a Manual on the Refrigeration of Fish (continued project): An advisory group of fishery technologists interested especially in iced and frozen fishery products cooperated in the preparation of a subject outline for the refrigeration manual. The object is to compile into one reference the current acceptable methods and equipment for preparation, transport, storage, and distribution of refrigerated fishery products. Much of the source material was collected late last year. During this year the writing and editing of the manual is expected to be completed. One technologist will be working part-time on the project. (Washington)

4. Cold-Storage Life of Fish (continued project): Studies have been completed or are in progress on the storage life of rockfishes, salmon, halibut, and various species of fresh-water fish under simulated commercial packaging and storage conditions. The work will be expanded to include other species of marine and fresh-water fish. Those fish showing limited cold-storage keeping quality will be further tested by improved handling and packing methods. This information on the cold-storage life of various fish provides a guide for packers and distributors in the handling and marketing of their fishery products. It serves, also, as a basis for the requirements in the Federal Specifications which insures government procurement of good quality fishery products. Much of the study will be concentrated on fresh-water species of fish. Because of the location of the Service's technological laboratories along the seaboard, work on the fresh-water fish has been neglected. However, 150,000,000 pounds of such fresh-water fish taken commercially each year make up a significant portion of the fisheries production. An understanding of the cold-storage characteristics of these and of the marine fish, and application of the findings, would undoubtedly tend to improve market quality and permit wider distribution. The study will be carried out on a part-time basis by one technologist. (Seattle)

5. Study of Cause of Texture Change of Canned Salmon Prepared from Frozen Fish (continued project): Freezing and storing salmon prior to canning causes undesirable quality changes in the final product. Among these changes are the toughening of the meat and the development of curd. Previous studies have shown: (1) that the physical alteration of the cell walls of the meat of the salmon during freezing and storage is at least partially responsible for the toughening; and (2) that the curd formation is probably related to chemical changes in the protein. The current phase of the project will be devoted to a study of the mechanism of the effect of brine on the meat of the fish in reducing the release of soluble protein to form the curd. The information will contribute materially to a fuller understanding of the proper use of brine dips for the reduction of drip in frozen fish. The work will be carried out by one technologist working full time. (Ketchikan)

PROCESSING AND PRESERVATION

1. Development of Specialty Food Products from Alaska Fish and Edible Fish-trimmings (continued project): In Alaska the more important fisheries are of a seasonal na-

ture. This situation poses serious economic problems for the local residents during the balance of the year. One possible way to augment earnings and extend the period of employment will be the establishment of industries more fully utilizing fishery resources during the "off-season." Studies will be continued to develop specialty food products from fish and from edible parts of the fish trimmings. The work will be carried out part-time by one technologist. (Ketchikan)

ANALYSIS AND COMPOSITION

1. Composition of Fish (continued project): There has been a growing demand by physicians, dietitians, nutritionists, and others for information on the composition of foods, including fishery products. Information is also needed by the fishery industry regarding the chemical composition of various organs and tissues of fish with a view to the preparation of new products. Much of the work on proximate composition for this year will be concentrated on the fresh-water fish for which there is little available information, and on the underutilized species of fish to promote their greater acceptance. The work will be carried out as a part-time project by one technologist. (Seattle)

2. Determination of Oil in Fish Meal (cooperative work with the Association of Official Agricultural Chemists)--continued project: The present official method for the determination of oil in fish meal is quite tedious and time consuming. A rapid but accurate method is needed to provide the efficiency needed in transactions involving the marketing of fish meals. Current studies involve adaptation of the Mojonnier-type extraction tube using various chemicals to hydrolyze the meal. The work is being carried out on a part-time basis by one technologist. (Seattle)

BYPRODUCTS

1. Vitamin Content and Nutritive Value of Fishery Byproducts (continued project):
a. BIOLOGICAL STUDIES: Chick assays for vitamin B₁₂ content of fish meals and fish solubles were conducted in 1953. Tests on the feasibility of adding fish oils to commercial poultry feeds, also begun last year, will be continued to determine conservative levels which may be fed without affecting the flavor of the meat or eggs. Studies begun late last year to determine the nutritive value of fish meal and fish solubles gave widely variable results not correlated with known differences in raw materials of processing methods used. More extensive feeding tests will be carried out this year on these fishery products in an effort to account for the wide differences in nutritive values observed. One technologist works part-time on this project. (College Park)

b. CHEMICAL AND MICROBIOLOGICAL STUDIES: Lack of information on the nutrient content of fishery byproducts is a serious handicap to the fishery byproducts and feed industries in the marketing and utilizations of these products. Analysis of meals and scrap for the various B vitamins will continue and the study will be broadened to include additional samples from the East Coast, such as solubles and crab meal. Further work on the isolation and identification of unknown growth factors will also be pursued. Two technologists will be assigned to work full time on these studies. (Seattle)

2. Utilization of Viscera from Round (Whole) Fish (new project): The freezing of round fish at sea will make available larger amounts of viscera at shore processing plants. Studies are planned to determine the uses for which the various components are suited, both to increase the revenue from fisheries activities and to utilize more effectively the viscera now discarded at sea. One chemist will work full time on the project as soon as a qualified man can be employed. (Boston)

3. Study of Pharmaceutical and Other Industrial Products from Salmon Eggs (continued project): Millions of pounds of salmon eggs are discarded every year at salmon canneries in Alaska for want of a suitable and profitable outlet. On the basis of preliminary work, salmon eggs may be a good potential source of pharmaceutical and other industrial products. During the current year the oil fraction of the eggs will be considered since it is a source for the long chain fatty acids that may be modified for specialized industrial applications. The study requires the full time of one technologist. (Ketchikan)

4. The Development of a Dried Product from Condensed Menhaden Solubles or Stickwater (continued project): Stickwater samples, collected from practically all the plants in production, were dried, chemical analyses completed, and hygroscopicity studies begun on the dried product during the past year. This year studies will be made to determine (1) what constituent or factor in the raw material causes the undesirable hygroscopicity; (2) what changes in methods of manufacture, as the use of additives, can be devised to yield a less hygroscopic dry product; (3) what packaging materials are most satisfactory for the dry product. One technologist is working full time on this project. (College Park)

5. Chemical Evaluation of Fish Oils and Investigation of New Uses (new project): The current domestic surplus of fats and oils makes imperative the need for the development of new uses for fish oils to broaden the market and increase their value. The initial phase of the project will involve a study of the chemical composition of fish oil, particularly menhaden. This basic information will be used to determine current and new uses for which the various components are best suited. The work will be carried out by one technologist. (Seattle)

REPORTS PUBLISHED DURING FISCAL YEAR 1953 ON SPECIFIC PHASES OF FISHERY TECHNOLOGICAL RESEARCH

COMMERCIAL FISHERIES REVIEW

The following technological articles appeared in Commercial Fisheries Review and were also issued as separates. The issue in which each article appeared and the number of the separate which was issued after the article was published in the Review are given.

Equipment and Procedure for Thawing Fish Frozen at Sea, Technical Note No. 21, by H. W. Magnusson, vol. 14, no. 7, July 1952, pp. 18-19 (Sep. 317).

Fish Frozen in Brine at Sea: Preliminary Laboratory and Taste-Panel Tests, Technical Note No. 22, by S. R. Pottinger, John Holston, and Grace McCormack, vol. 14, no. 7, July 1952, pp. 20-23 (Sep. 318).

Preliminary Investigation of the Southeastern Alaska Abalone (Haliotis kamtschatkana), Part II - Technological Studies on Handling Aboard Ship and Preparation Ashore, and Acceptability of the Cooked Products, by C. J. Carlson and J. A. Dassow, vol. 14, no. 9, September 1952, pp. 16-18 (Sep. 322).

Freezing Fish at Sea, Defrosting, Filleting, and Refreezing the Fillets - Project Review for Period December 1950-September 1952, by Boston Laboratory Staff, vol. 14, no. 10, October 1952, pp. 28-39 (Sep. 324).

Freezing Fish at Sea - New England. Part 5 - Freezing and Thawing Studies and Suggestions for Commercial Equipment, by H. W. Magnusson and J. C. Hartshorne, vol. 14, no. 12a, December 1952 Supplement, pp. 8-23 (Sep. 328).

Freezing and Cold Storage of Pacific Northwest Fish and Shellfish: Part I - Storage Life of Various Rockfish Fillets, by D. T. Miyauchi and M. E. Stansby, vol. 14, no. 12a, December 1952 Supplement, pp. 24-28 (Sep. 329).

Freezing and Cold Storage of Pacific Northwest Fish and Shellfish: Part II - King Crab, by Martin Heerdt, Jr. and John A. Dassow, vol. 14, no. 12a, December 1952 Supplement, pp. 29-35 (Sep. 330).

A New Liquid Medium for Freezing Round Fish, Technical Note No. 22, by John A. Holston, vol. 14, no. 12a, December 1952 Supplement, pp. 36-40 (Sep. 331).

Feeding Fish Meals and Solubles to Chickens Does Not Affect Flavor of Meat, Technical Note No. 23, by Hugo W. Nilson, vol. 14, no. 12a, December 1952 Supplement, pp. 41-42.

A Portable Immersion Freezer, Technical Note No. 24, by C. G. P. Oldershaw, John A. Holston, and S. R. Pottinger, vol. 15, no. 2, February 1953, pp. 32-34 (Sep. 342).

Freezing Fish at Sea - New England. Part 6 - Changes and Additions to the Experimental Trawler Delaware, by C. G. P. Oldershaw, vol. 15, no. 3, March 1953, pp. 25-28 (Sep. 345).

Amino Acid Content of Salmon Roe, Technical Note No. 25, by Harry L. Seagran, vol. 15, no. 3, March 1953, pp. 31-34 (Sep. 346).

REPORTS OF THE FISHERIES EXPERIMENTAL COMMISSION OF ALASKA

Alaska Seafood Recipes, edited and revised by Charlotte D. Speegle and Marjorie Bassett, Fishery Products Laboratory, Ketchikan, booklet, 80 pages, 1951. Published jointly by the Alaska Fisheries Experimental Commission, and the Alaska Development Bd. and Agricultural Extension Service, June 1952.

Additional Studies of the Seasonal Variations in Toxicity of Butter Clams from Selected Alaska Beaches, by J. S. Chambers, H. J. Craven, and Donna M. Galerman, Technical Report No. 3, Fisheries Experimental Commission of Alaska, Fishery Products Laboratory, Ketchikan, Alaska, August 1952.

Biennial Report, Fisheries Experimental Commission of Alaska, Fishery Products Laboratory, Ketchikan, Alaska, 8 pages, January 1953.

REPORTS IN TRADE OR SCIENTIFIC PERIODICALS

The Amazing Fish Meal Industry, by F. B. Sanford, Feedstuffs, vol. 23, no. 23, June 9, 1952, pp. 18-24.

Experiments in Feeding Menhaden Oil to Broilers, by H. W. Nilson. Presented at the Byproducts Meeting of the National Fisheries Institute, Washington, D. C., April 14, 1953.

Riboflavin, Niacin, and Vitamin B₁₂ Content of Some Fishery Byproducts, by Neva Karrick. Presented at the Byproducts Meeting of the National Fisheries Institute, Washington, D. C., April 14, 1953.

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Alaska Salmon Waste Potential, by Howard J. Craven. 1953 National Fisheries Institute Yearbook, Washington, D. C., p. 107.

Report on Fat in Fish Meal, by M. E. Stansby. Journal of the Association of Official Agricultural Chemists, vol. 36, no. 2, May 1953, pp. 202-208.





TRENDS AND DEVELOPMENTS

Additions to the U. S. Fleet of Fishing Vessels

A total of 107 vessels of 5 net tons and over were issued first documents as fishing craft during June 1953--8 more than in June 1952. Washington led with 36 vessels, followed by Alaska with 18 vessels and Florida west coast with 9 vessels, the Bureau of Customs of the Treasury Department announced.

Vessels Obtaining Their First Documents as Fishing Craft, June and July 1953									
Section	June		Six months ending with June		July		Seven months ending with July		Total 1952
	1953	1952	1953	1952	1953	1952	1953	1952	
	(Number)								
New England ..	4	7	14	17	2	3	16	20	30
Middle Atlantic	1	2	10	18	3	3	13	21	26
Chesapeake ..	11	6	36	33	6	7	42	40	65
South Atlantic .	10	8	50	41	12	10	62	51	89
Gulf	20	20	112	63	24	10	136	73	161
Pacific	43	50	108	159	22	19	130	178	203
Great Lakes ..	-	2	5	6	-	1	5	7	13
Alaska	18	4	35	74	2	2	37	76	88
Hawaii	-	-	-	-	1	-	1	-	-
Total	107	99	370	411	72	55	442	466	675

NOTE: VESSELS HAVE BEEN ASSIGNED TO THE VARIOUS SECTIONS ON THE BASIS OF THEIR HOME PORT.

In July 1953, 72 vessels of 5 net tons and over received their first documents as fishing craft--17 more than in July 1952. Florida led with 18 vessels, followed by Washington with 12, and Texas and California with 9 vessels each.



Cans--Shipments for Fishery Products, January-July 1953



Total shipments of metal cans for fish and sea food during January-July 1953 amounted to 61,818 short tons of steel (based on the amount of steel consumed in the manufacture of cans). Comparative data for 1952 is not available, but it is believed that this year's shipments are larger principally because of the larger tuna pack reported by West Coast fish canneries.

NOTE: STATISTICS COVER ALL COMMERCIAL AND CAPTIVE PLANTS KNOWN TO BE PRODUCING METAL CANS. REPORTED IN BASE BOXES OF STEEL CONSUMED IN THE MANUFACTURE OF CANS, THE DATA FOR FISHERY PRODUCTS ARE CONVERTED TO TONS OF STEEL BY USING THE FACTOR: 23.0 BASE BOXES OF STEEL EQUAL ONE SHORT TON OF STEEL.

California

NO SARDINES OFF COAST: The California Fish and Game Commission has officially acknowledged that there are virtually no sardines (pilchards) off California's coast, reports a September 2 release from the California Department of Fish and Game. The acknowledgement came at the Commission's August 28 meeting. The Commission at this meeting refused to renew any sardine reduction permits. This was merely acceptance of the fact that California's sardine catch, which once reached over a half-million tons a year, has dwindled to practically nothing.

The Commission has regulatory power over the reduction plants only; it has had no control over the canneries, which take by far the greatest number of the once plentiful California sardines.

The sardine catch for the 1950/51 season, the last good year, was 355,000 tons, of which only 36,000 tons were used for reduction. In 1951/52 the catch fell to 136,000 tons, and only 1,000 tons of this was taken for reduction. In the 1952/53 season, a mere 3,600 tons were taken--hardly a single night's haul in the days when California sardines were plentiful, it was pointed out. Only 11 tons of these were used by the reduction plants.

* * * * *

OCEANOGRAPHIC DATA AS RELATED TO PACIFIC SARDINE COLLECTED BY "YELLOWFIN" (Cruise 53-Y-6): Data for determining the oceanographic factors responsible for the behavior, spawning success, and survival of Pacific sardine (pilchard) were collected by the California Department of Fish and Game's research vessel Yellowfin on an 11-day cruise completed at Los Angeles on June 14. This was a routine hydrographic cruise of the California Cooperative Oceanic Fisheries Investigations to the coastal and offshore area from San Diego to Pt. Conception and around the Channel Islands, reports a July 13 release from the Department.

The following data were collected on the cruise: 35 hydrographic stations completed; 3 between-station plankton tows taken; hourly BT's (bathythermographs) lowered between offshore stations and half-hourly on the inshore stations; continuous subsurface and surface ocean temperatures recorded; 79 "jog-log" observations (GEK or Geomagnetic Electro Kinetograph) made; fish sampled on one night station; and fish, mammal, and bird observations logged.

No fish schools were seen except sauries. Weather conditions were not severe enough to hamper oceanographical work, but did limit fish sampling to the first night station.

* * * * *

TUNA TAGGED OFF BAJA CALIFORNIA BY M/V "VIRGINIA R." (Cruise No. C-2-53): A total of 799 yellowfin and skipjack tuna were tagged by the commercial vessel M/V Virginia R. on a 53-day cruise off the west coast of Baja California, completed at San Diego on July 31. The vessel was chartered by the State of California Department of Fish and Game to continue the experimental tagging of yellowfin and skipjack tuna with tag types "F" and "G," reports an August 28 release from that agency.

Almost all of the schools encountered on the cruise consisted of skipjack tuna, with a few small one-pole yellowfin mixed in. In all there were 581 skipjack and 218 yellowfin tagged. Fishing was generally slow, but the vessel was able to maintain a good average from day to day. The tagged fish were taken from about 80 different schools of yellowfin and skipjack.

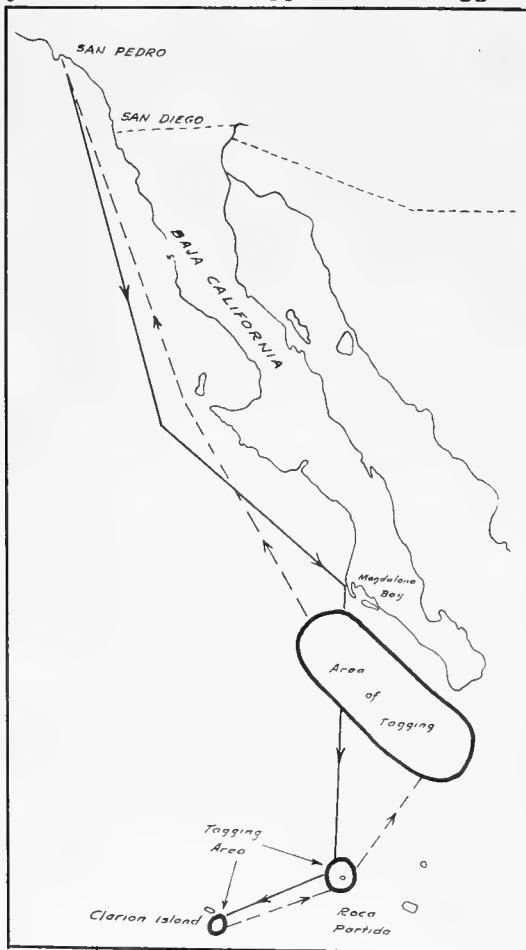
During the first three days of the trip the fish for tagging were caught and passed by a crew member of the vessel fishing in the corner rack on the port side. This proved to be inadequate since by the time the skipjack were picked up from the deck and placed in

the tagging cradle most of them had vibrated themselves into such a frenzy that it was practically impossible to tag the fish and release them in good condition. It was decided to catch the fish on the starboard side. This proved to work reasonably well. The fish could be dropped in or near the cradle as they were brought aboard. Generally, even the skipjack had a brief period of quiescence and if the tag was inserted within 15 to 20 seconds, the fish could be released in good shape. There were some that vibrated immediately and could not be tagged. Practically all of the fish released after the first 3 days of tagging were in excellent condition.

By the end of August, 6 tagged skipjack and 1 tagged yellowfin were recovered; all from local fishing grounds.

* * * * *

TUNA TAGGED BY M/V "DEFIANCE" (Cruise C-3-53): A total of 998 tuna (934 yellowfin and 64 skipjack) were tagged by the commercial fishing vessel Defiance on a 63-day cruise completed at San Pedro on August 8. The vessel was chartered by the California Department of Fish and Game to continue experimental tuna tagging off the west coast of Baja California, Roca Partida, and Clarion Island, an August 28 release from that Agency states. The cruise was also for the purpose of gaining experience in commercial fishing methods and making incidental collections of post-larval fish with a night light.



M/V DEFIANCE TUNA TAGGING CRUISE C-3-53,
JUNE 6-AUGUST 8, 1953.

Three different types of tags were used: type "E" (198 tags), "F" (412 tags), and "G" (388 tags). Eight night-light stations were occupied, but the material is yet to be identified.

Two tags had been recovered by the end of August:

One type "G" on a yellowfin tuna caught by a purse seiner on the same day and in the same area as it was released. The other type "E" on yellowfin tuna also caught by a purse seiner after being at liberty for 44 days in which time it grew 19 mm. ($\frac{3}{4}$ inch). This fish was tagged and released off the east end of Clarion Island and recaptured 38 miles SE. of Cape Tosco, Baja California, a general movement to the N. x NE. of 375 miles.

* * * * *

FISH AND GAME COMMISSION ACTIONS: The California Fish and Game Commission at its August 28 meeting took the following actions, reports a September 2 release from the Division of Fish and Game:

(1) Granted permits to three oil companies for continuing seismic exploration off the coast of Santa Barbara. The Commission followed the lead of the State Lands Commission, which previously conducted a detailed hearing on the controversial operations and also issued permits for the explorations.

(2) It simplified rules for importation of spiny lobsters during the California closed season.

(3) Closed the Salton Sea to the taking of shellfish to permit establishment of a sports fishery there.

(4) Fifty-four shrimp fishermen were granted an extension of their permits to allow them to continue fishing through September 30 (the end of the regular season) on the shrimp and prawn beds recently discovered by Department of Fish and Game research teams. This action takes care of a technicality in the law.

(5) Refused to renew any sardine reduction permits.



Federal Purchases of Fishery Products

FRESH AND FROZEN FISHERY PRODUCTS PURCHASED BY DEPARTMENT OF THE ARMY, JULY 1953: The Army Quartermaster Corps in July 1953 purchased 2,465,620 pounds (valued at \$838,801) of fresh and frozen fishery products for the military feeding of the U. S. Army, Navy, Marine Corps, and Air Force (see table). This was a decrease of 47.0 percent in quantity and 50.6 percent in value as compared with June purchases, but 8.1 percent greater in quantity and 23.6 percent less in value than a year ago.

Army Quartermaster Corps purchases of fresh and frozen fish during the first seven months in 1953 totaled 16,065,538 pounds (valued at \$6,844,252), less by 15.2 percent in quantity and 20.1 percent in value as compared with the similar period a year earlier.

Purchases of Fresh and Frozen Fishery Products by Department of the Army (July and the First Seven Months of 1953 and 1952)							
QUANTITY				VALUE			
July		January-July		July		January-July	
1953	1952	1953	1952	1953	1952	1953	1952
Lbs.	Lbs.	Lbs.	Lbs.	\$	\$	\$	\$
2,465,620	2,279,901	16,065,538	18,504,481	838,801	1,097,619	6,844,252	8,568,666

The over-all average price paid for fresh and frozen fishery products by the Department of the Army continued to be much lower than last year. In July the average price was 34.0 cents per pound, compared with 36.5 cents in June and 48.1 cents in July 1952.

In addition to the purchases of fresh and frozen fishery products indicated above, the Armed Forces generally make some local purchases which are not included in the above figures. Therefore, actual purchases are somewhat higher than indicated, but it is not possible to obtain data on the local purchases made by military installations throughout the country.



Florida

ANOTHER "RED TIDE:" Another "red tide," beginning off St. Petersburg, Florida, on September 3, killed a large quantity of fish in an area 5 to 20 miles from shore extending in patches along 60 miles of the coast from Clearwater to Venice, reports the Service's Branch of Fishery Biology. On September 15 dead fish had washed ashore at several points and local citizens were engaged in removing them from the beaches. Fish were dying over a wide area and no indications of a change of conditions to stop the "red tide" were evident.

A tremendous bloom of the micro-organism Gymnodinium brevis causes "red tides." Metabolism products of this organism are apparently toxic to fish and other marine organisms. When the G. brevis concentration reaches a certain point, fish and other marine organisms die. This results in considerable fish loss and contamination if they are washed ashore.

Cultures of the organism are being observed alive at the Service's Galveston, Texas, laboratory. The Service has been conducting research on "red tide" causes since the large bloom and resultant fish kill of 1947. Water samples from the area most recently infected contained as high as 2,000 organisms per milliliter of water. It is believed heavy river run-off combined with quiet wind conditions produces enriched water and conditions conducive to rapid growth of the organism. A theory has been developed for possible control measures by detecting and poisoning small patches of the organism.

While processing data collected during the November 1952 outbreak of "red tide" off the coast of Florida, the Service's Gulf Fishery Investigations found good evidence that effluents of the Caloosahatchee River are important agents in such blooms. It has been noted that activity of this type is probably due to organic content as well as to physical attributes. Experimental work in tanks has indicated that high light intensity, vitamin B₁₂, and sulfides are some of the requirements for mass growth of dinoflagellates as well as other organisms.

Chemical analyses that have been made by the Geochemistry and Petrology Branch, U. S. Geological Survey, show that significant quantities of titanium and zirconium were present in the "red tide" bloom water--and not in other waters such as Lake Okeechobee, the surface of Sigsbee Deep, and the tidal lagoon at Galveston.



Indonesians to Study Modern Fishery Development Management in United States

Five fishery technicians have arrived in the United States from Djakarta, Indonesia, on Foreign Operations Administration grants for a year's in-service training and advanced instruction under guidance of the Fish and Wildlife Service, Secretary of the Interior Douglas McKay announced September 1.

They are the first of a group of 11 Indonesians who will be trained in the United States in various aspects of modern fishery development during 1953/54.

Three of the trainees will receive instructions in Diesel engineering and refrigeration at the San Diego Vocational School. The other two will take in-service training in fishery statistics in Washington, D. C., and Gloucester, Mass., and will study statistical theory and practice at the University of North Carolina's agricultural school, for the purpose of improving Indonesia's methods of compiling fishery statistics.



Lease Bid Received for American Samoa Fish Cannery

The one lease bid submitted for the fish cannery in American Samoa was opened on September 14 by the Pacific Division of the Office of Territories, U. S. Department of the Interior. The Government of Samoa had requested offers for lease of the fully equipped cannery on that Island.

As required by the invitation, the bid was for an initial five-year lease. The sole bidder offered to lease the cannery for \$5,000 each year, or \$2.50 per short ton of fish processed, frozen, canned, or stored for eventual shipment, whichever is greater.

The bidder stated his intention, in accordance with the draft contract, to train Samoans in fishing skills and to make available to the Samoans all the employment in the cannery to the extent they can be taught the necessary skills.

The bidder was a California fish cannery. If the bid is accepted, it will go into effect on January 1, 1954. The Department reserved the right to reject any and all bids.

NOTE: ALSO SEE COMMERCIAL FISHERIES REVIEW, JUNE 1953, PP. 30-31.



Huge Halibut Presented to President

One of the largest halibut ever caught off the coast of the State of Washington was presented to the nation's First Family on October 1 by the nation's fishing industry. President Eisenhower accepted the huge 200-pound fish from Representative Thor C. Tollefson, chairman of the Fisheries Subcommittee of the House Merchant Marine and Fisheries Committee and Robert M. Meehan who represented the National Fisheries Institute. Tollefson is a Republican Representative from Washington, where fishing is the second largest industry.



The donors brought the seven-foot halibut to the White House in a truck. Strung up on a block-and-tackle, the fish was in full view for President Eisenhower's inspection.

The halibut was caught by commercial fishermen. As soon as they saw the size of their catch, they said: "That's for Ike." The fish was turned over to a Seattle dealer who froze and shipped the halibut to Washington, D. C.

WITH PRESIDENT EISENHOWER (ON THE RIGHT) ARE L. TO R. REP. THOR C. TOLLEFSON, CHAIRMAN OF THE FISHERIES SUBCOMMITTEE OF THE HOUSE MERCHANT MARINE AND FISHERIES COMMITTEE, AND ROBERT M. MEEHAN WHO REPRESENTED THE NATIONAL FISHERIES INSTITUTE.

A recipe for broiling halibut steaks--a special one prepared by the National Fisheries Institute--was given the President by Tollefson.



Maine

DEAD HERRING OFF COAST: Millions of dead herring, totaling about 300,000 pounds, were found in Love's Cove, Maine, on July 18 and 19 and on July 31-August 2, reports the Service's Branch of Fishery Biology. Whiting, harbor pollock, tomcod, and small flounders were dead also. At both kills, 20 to 30 seals were on a ledge at the Cove mouth. Green crabs taken from traps were either dead or lethargic, a condition which indicated oxygen depletion near the bottom.

Disease did not seem to have caused the mortalities. A large school of immature herring (britts), possibly pursued by whiting, pollock, tomcod, and seals, probably entered the Cove on July 18 and 19 on an ebbing tide. Because oxygen was depleted at low tide, most of the fish died. Occurrence of a second kill two weeks later, when the tidal cycle was the same, substantiates this theory.



New England Tuna Explorations

POOR TUNA FISHING REPORTED BY "MARJORIE PARKER" (Cruise No. 2): Only 600 pounds of bluefin tuna were caught in the Gulf of Maine by the Service-charted exploratory fishing vessel Marjorie Parker on a 25-day cruise. This cruise, the second of the season, was completed on August 25 at Portland, Maine. Adverse weather was encountered on part of the trip.

During the first stages of the trip the vessel operated in the northeastern sector of the Gulf of Maine, working 15 long-line stations at distances from 50 to 150 miles offshore, covering Cashes Ledge, Fippennies Ledge, and the northern edge of Georges Bank. From August 18 to August 25 explorations were carried on in the South Channel, Southwest Georges Bank, and Pollock Rip Lightship areas at distances of 120 to 180 miles from Portland, Maine.

Floating long lines, surface troll lines, and drift trammel nets were fished, but long lines were principally used. Fishing results were poor. Blue sharks were abundant, fouling long lines and impeding fishing operations. A total of 210 sharks was captured on the long-line gear.

Surface troll lines caught four tuna with an average weight of 45 pounds. Only one school of tuna was observed during the trip and a set of 20 baskets (460 hooks) made near the school was unsuccessful. Trammel net fishing at night also failed to produce tuna. A total of 250 baskets (5,000 hooks) was fished, with an average rate of 20 baskets (400 hooks) per station.

The Marjorie Parker was scheduled to depart Portland, Maine, August 28 on Cruise No. 3, and return on or about September 10. Using long lines, surface troll lines, and drift trammel nets, the vessel was to fish in the offshore waters, southeast of Georges Bank in the area between 65°40'-66°20' W. longitude and 40°50'-43°00' N. latitude.



New York

HUDSON RIVER SHAD CATCH DECLINED IN 1953: The 1953 Hudson River shad catch in New York waters amounted to 456,858 pounds, 17.5 percent less than the 553,262 pounds caught in 1952, according to preliminary figures supplied by the Service's Fishery Marketing Specialist in that area. Fishing was conducted under special shad gill-net permits issued by the State of New York.

The breakdown of the 1953 catch is as follows:

Stake nets (90 licenses): roe shad 91,318 pounds (22,629 fish); buck shad 50,284 pounds (17,929 fish). Total value to the fishermen: approximately \$26,000.

Drift gill nets (109 licenses): roe shad 171,636 pounds (42,019 fish); buck shad 143,620 pounds (59,540 fish). Total value to the fishermen: approximately \$35,000.



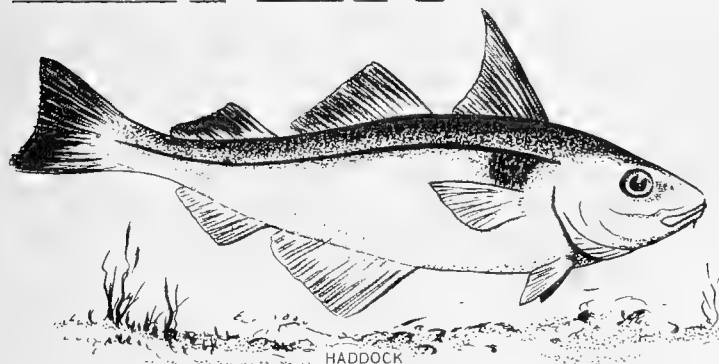
SHAD

The appearance of a large quantity of menhaden in the Raritan Bay area was believed responsible for the poor catch of shad in that area. The 1953 catch in the Raritan Bay area was considerably under that of a year ago.



North Atlantic Fishery Investigations

EFFECT OF COD-END COVER UPON HADDOCK ESCAPEMENT TESTED BY "ALBATROSS III" (Cruise No. 52): The effect of the trawl cod-end cover upon the escapement of haddock was tested by the Albatross III, the Service's research vessel operating in the Northwest Atlantic, on Cruise No. 52. The vessel, which sailed from Woods Hole, Mass., on July 20 and returned on July 29, fished on the southwest and southeast parts of Georges Bank.



HADDOCK

Fishing was conducted only during daylight hours. An ideal concentration of fish was found after some searching. Of a total

of 28 completed tows, 11 good pairs were obtained for studying the effect of the cod-end covers. Cod ends of $6\frac{1}{2}$ -inch mesh (knot centers) constructed of 45-yard, 4-thread manila twine were used.

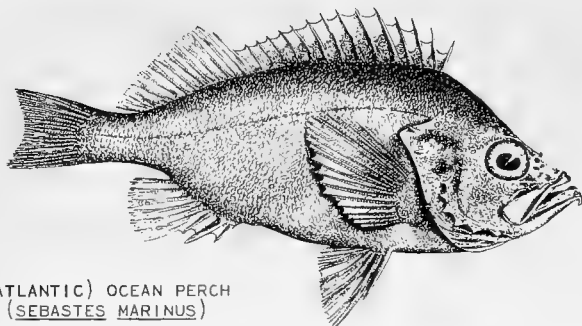
The appropriate sizes of haddock were taken in sufficient abundance to provide very good results.

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OCEAN PERCH DISTRIBUTION STUDIED BY "ALBATROSS III" (Cruise No. 53): In order to study the distribution of ocean perch (*Sebastes*) and to collect biological and physical data of the habitat in which they are found, the Service's research vessel Albatross III left Woods Hole, Mass., on August 10 and returned to port August 21, 1953. The vessel operated in the Gulf of Maine and the southern edge of Georges Bank and Nantucket shoals.

A total of 34 trawl tows was made and about 1,500 ocean perch were sexed and measured; also, 29 BT drops were made, and 4 hydrographic stations were occupied. Approximately 120 bottom photographs were taken, accompanied by bottom scoop sam-

ples in each area photographed. The pictures obtained were clear and sharp with many bottom organisms visible. A line trawl was set 5 times and the one-meter plankton net was towed once.



(ATLANTIC) OCEAN PERCH
(SEBASTES MARINUS)

Ocean perch were collected in depths ranging from 35 to approximately 240 fathoms. The smallest ocean perch (30 mm.) yet taken was fished from shoal water. Some previous unfished stocks of ocean perch were sampled in deep water; specimens up to 47 cm. in length were caught.

Numerous notes were made of the stomach contents of cod, haddock, whiting, white hake, and ocean perch. An experimental vertical line trawl was fished several times at night--whiting and hake were caught, but no ocean perch.

Efforts to tag ocean perch proved fruitless. Even the ocean perch brought to the surface from shallow depths of 35-40 fathoms were badly blown and unable to return to the bottom.

* * * * *

ZERO-AGE HADDOCK DISTRIBUTION STUDIED BY "ALBATROSS III" (Cruise No. 54): A 13-day cruise to collect data to determine the distribution and numbers of zero-age haddock in connection with early life history and year-class strength studies was completed by the Service's research vessel Albatross III at Woods Hole, Mass., on September 14. The area covered was Georges Bank and the Gulf of Maine.

Zero-age haddock were found in a very limited area (South Channel and the Gulf of Maine) while yearling fish of other species were more widely dispersed. No young haddock were found off the bottom.

Sixty-seven 20-minute tows with a No. 36 trawl were made throughout the area. One-hundred bathythermograph lowerings were made. In addition, at selected stations horizontal tows with a 1-meter ring net attached to the towing warp were made.

Further analysis of the distribution of zero-age haddock will have to await the completion of a similar sampling of the Southern New England Banks.



North Pacific Exploratory Fishery Program

SALMON RESOURCES ADJACENT TO ALEUTIAN ISLANDS INVESTIGATED BY "JOHN N. COBB" (Cruise No. 16): An investigation of the salmon resources in the offshore waters adjacent to the Aleutian Islands, Alaska, was conducted by the John N. Cobb on an extended cruise which was completed on August 8. The vessel, one of the Service's exploratory fishing vessels, sailed from Seattle on May 18.

The investigation was part of the preliminary salmon research by the Service in connection with the International Convention for the High Seas Fisheries of the North Pacific Ocean. Objectives were to gain as much knowledge as possible concerning salmon in offshore waters, and to test and evaluate the effectiveness of various types of fishing gear for catching salmon on the high seas. Since it was necessary to obtain samples of salmon from as large an area as possible, the John N. Cobb changed fishing locations frequently.

Gill nets, trolling gear, floating long lines, and a trap were fished, but only the gill nets proved successful as a means of catching salmon. The gill nets used were 100

fathoms to a shackle, 75 meshes deep, and made of $5\frac{1}{4}$ -inch (stretched mesh) linen netting. As a rule, either 5 or 10 shackles were fastened together and set as a string.

Fishing operations commenced on June 9 and ended on July 28. From June 9 to July 17 the vessel operated in the Pacific Ocean from Unalaska Island to near Agattu Island at distances from 15 to 60 miles offshore. From July 17 to July 28 operations were carried on in the Bering Sea from Umnak Island to Kiska Island at distances from 5 to 45 miles offshore. During the trip approximately 1,200 salmon were taken and frozen for additional study in the Service's Seattle laboratory.

Catches of salmon varied considerably in individual gill-net sets, ranging from 0 to 18 per 100-fathom shackle in Pacific Ocean sets, and from 1 to 28 in Bering Sea sets. Salmon catches consisted of 32 percent red, 3 percent silver, 26 percent pink, and 39 percent chum salmon in the Pacific Ocean fishing; and 2 percent red, 1 percent silver, 3 percent pink, and 94 percent chum in the Bering Sea fishing.

Weights, measurements, and other information concerning the salmon caught will be determined from the samples brought to Seattle.

This exploration was carried out as a joint operation by the Service's Branch of Commercial Fisheries and the Branch of Fishery Biology. A biologist from the Fisheries Research Institute at the University of Washington also accompanied the vessel.



Ohio's Lake Erie Commercial Fisheries Production, 1952

The total catch of fresh-water fish by Ohio's commercial fisheries of Lake Erie amounted to 21,246,640 pounds in 1952, a 14 percent increase over the 18,700,118 pounds landed in 1951, reports a recent bulletin from the Ohio Department of Natural Resources (see table). This increase was due mainly to the large rise in blue pike landings and lesser increases in landings of carp and catfish.

Ohio's Lake Erie Commercial Fisheries Production, 1952 and 1951					
Species	1952	1951	Species	1952	1951
	Lbs.	Lbs.		Lbs.	Lbs.
Blue pike	5,530,995	1,867,055	Sturgeon	6,047	10,039
Bullheads	58,280	43,750	Suckers	586,576	516,850
Burbot	229,749	178,295	White bass	764,463	943,996
Carp	2,108,355	1,558,814	Whitefish	213,114	375,254
Catfish	1,492,209	1,258,403	Yellow perch	1,555,995	2,396,695
Cisco	20,641	92,445	Yellow pickerel ...	4,839,833	5,418,135
Goldfish	100,306	125,647	Buffalofish	8,343	2,323
Mooneye	14,352	20,918	Miscellaneous	1,049	552
Sauger	203,208	388,033			
Sheepshead	3,513,125	3,502,914	Total	21,246,640	18,700,118

In 1952 blue pike was the leading species landed by Ohio's Lake Erie commercial fisheries and comprised 26 percent of the total; followed by yellow pickerel, 22 percent; sheepshead, 17 percent; carp, 10 percent; yellow perch, 7 percent; and catfish, 7 percent. The leading item in 1951 was yellow pickerel, 29 percent; followed by sheepshead, 19 percent; and yellow perch, 13 percent.



Pacific Oceanic Fishery Investigations

UNEXPLOITED TUNA RESOURCE CLOSE TO HAWAII FOUND BY "JOHN R. MANNING" (Cruise No. 16): Evidence of an unexploited and potentially valuable commercial tuna resource close to the Hawaiian Islands was gathered by the research vessel John R. Manning on a 6-week cruise completed at Kauai on August 31. The vessel, operated by the Service's Pacific Oceanic Fishery Investigations (POFI), caught over 200 yellowfin tuna (about 10,000 pounds) by a small amount of experimental long-line fishing gear in only 5 days of fishing. The vessel operated along the 155th and 160th meridians in the equatorial region south of Hawaii. Remarkably good fishing for yellowfin tuna was found between 2 and 4 degrees north of the equator on 155° W. longitude, and in the vicinity of Christmas Island. A number of albacore were also taken and this species would undoubtedly be a profitable secondary product of a yellowfin fishery in those waters.

Several promising innovations in tuna long-line gear were tested during the cruise with the object of developing a type of line more efficient than that now used by Hawaiian and Japanese fishermen. These experiments included the substitution of hemp for the usual more expensive cotton line, variations in the spacing of the hooks along the main line, and a new method of attaching the branch lines to the main line designed to reduce tangling. It was found that tangling, ordinarily a time-consuming and troublesome feature of long-line fishing, can be virtually eliminated, and it is thought that the new method will enable fishermen to operate more gear and catch more tuna. The results of the hook-spacing experiments indicate that the most efficient arrangement is approximately 10 hooks to each 1,000 feet of main line.

Twelve stations were fished on 155° between 10° N. and 4° S. latitude. In addition, 3 stations were fished between 155° and the vicinity of Christmas Island. At each of these stations 50 to 60 baskets of long-line gear were fished, of which 30 had 6 hooks per basket of gear; and varying numbers (usually 20 and 10) of the baskets had 11 and 21 hooks, respectively. The best fishing occurred between 2° and 4° N. latitude in the oceanic areas, and in the vicinity of Christmas Island. The 5 consecutive stations within these limits yielded the following catches of yellowfin: six-hook baskets 11 per hundred hooks, 0.6 fish per basket; 11-hook gear, 9 per hundred hooks, 0.7 per basket; 21-hook baskets, 9 per hundred hooks, 1.8 per basket. The catches of the 21-hook gear are, however, not comparable to the catches on the other gear as the experimental design of this preliminary trial does not permit direct comparison. These catches indicate a very marked concentration of yellowfin tuna, a concentration that should support a United States fishery.

Fishing was not spectacular along 160° between 3° S. and 9° N. latitude. As on 155°, the best fishing occurred in the south equatorial current north of the Equator.

The catches of the 3 types of gear mentioned indicate that the 11-hook baskets are more efficient than the 6-hook baskets. Because of the increased hauling time of the 21-hook gear, this type does not appear suitable for commercial use. A swiveling arrangement that virtually eliminates time and energy-consuming tangles was given a thorough test on this cruise. Its eminent success indicates an improvement that should permit a crew to fish more gear per day, improving the prospects for United States exploitation of the resource.

Three baskets of gear made of factory-tarred Italian hemp line were fished each day. Towards the end of the cruise this gear became too slick to be pulled with the Japanese line hauler, indicating it is not a suitable material for this type of line fishing.

Scientific findings of the expedition included the capture of a variety of mackerel shark hitherto known only from the Atlantic, and the discovery of evidence that yellowfin tuna were actively spawning in the area where the best fishing was found. The scientists collected samples of scales and vertebrae from over 400 tuna, and will attempt to read the annual rings in these specimens in order to gain information on the age and growth rate of the fish.

Several days were spent at Christmas Island exploring possible sites for the installation of devices to automatically record seasonal changes in the temperature of the ocean around the island, which lies in the heart of the rich equatorial fishing grounds. The results of this reconnaissance will be used in planning the possible future establishment of a small field station on Christmas Island.

The seven tons of yellowfin and albacore landed by the John R. Manning were delivered to a Kauai cannery for processing. POFI scientists will keep a constant check on these fish as they pass through the cannery in order to evaluate their quality in comparison with tuna from Hawaii and West Coast fishing grounds.

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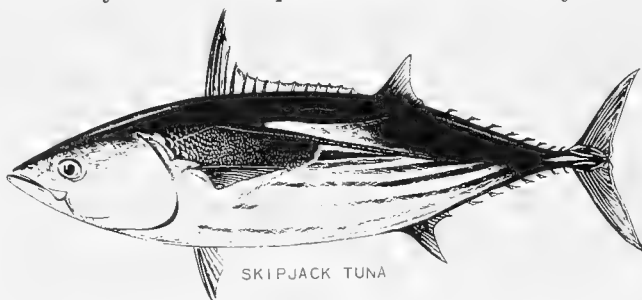
"CHARLES H. GILBERT" SCOUTS FOR TUNA IN HAWAIIAN WATERS (Cruise 11): Quantitative scouting for surface schools of skipjack and other tuna in Hawaiian waters was carried out by the Charles H. Gilbert, a research vessel of the Service's Pacific Oceanic Fishery Investigations (POFI) on a 34-day cruise completed at Honolulu on April 30. The vessel also executed weekly hydrographic sections on a line running north and south between Oahu and Molokai.

A systematic scouting for surface schools of skipjack and other tunas was carried out in Area I north of Oahu and in Area II south of Oahu. A total of 47 bird flocks were sighted in Area I, a scouting distance of 360 miles, while in Area II 58 flocks were seen in 720 miles of scouting. Several of the schools attended by bird flocks were investigated by means of actual live-bait fishing and surface trolling in order to determine the kind of fish schools, the sizes of fish in the schools, and the approximate size of the schools. A few good traces of fish schools were obtained on a depth recorder.

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SKIPJACK TUNA CONCENTRATIONS DISCOVERED OFF HAWAIIAN ISLANDS BY "CHARLES H. GILBERT" (Cruise 13): Many large schools of skipjack or striped tuna (aku) were observed concentrated in areas both to the north and south of the Hawaiian Islands by the Charles H. Gilbert on a 38-day cruise completed at Honolulu July 12.

Following a regular search pattern designed to furnish data for estimating the quantities of tuna present in the vicinity of the islands, the vessel encountered more skipjack schools per unit of area north of the Islands than immediately to the south of them, with an especially heavy concentration of fish extending east and west of a point some 50 miles northeast of Oahu. Farther to the south, however, two other widely separated areas of tuna abundance were found at 100 and 200 miles south of Honolulu. All of these concentrations were outside the area regularly fished by the local sampan fleet.



In contrast, very little activity was noticed in inshore areas to the south of the islands, with a notable scarcity of fish schools south of Molokai and Lanai. Generally, the greater numbers of schools were sighted on the scouting runs made in the east to west direction, with lesser numbers on the west to east runs, the latter being caused by less favorable scouting conditions when running upwind or possibly because of the easterly movement of the tuna schools. The north-south runs showed no significant differences in the number of sightings with the direction of the vessel.

A part of this cruise was devoted to the testing of chemical and visual attractants at sea, using various combinations of tuna extract and artificial bait on skipjack schools. The tuna extract alone failed to obtain any noticeable response from the skipjack, which appeared to be neither attracted nor repelled by it. Artificial bait of various kinds such

as cellophane strips, tin-foil squares, aluminum-foil strips, and tin strips were tried as possible visual attractants of skipjack. These materials were chummed alone or together with extract. Shiny materials, such as tin-foil squares and tin strips attracted the fish momentarily, in some cases even getting the fish away from feeding on the remaining live bait (chumming with live bait was stopped just before chumming with artificial bait). The momentary response was probably caused by the resemblance of the glittering material to live bait, but the fish were seen to turn away from the material after approaching it once. Stomachs were examined of the fish which were caught from the school on which tin strips were tested, and in 2 out of 17 stomachs, 1 strip apiece was found.

Chumming of dead bait (nehu) from the forward well deck occasionally brought response from the fish, which followed the bait as it sank. The skipjack soon returned to the surface when live-bait was chummed.

No noticeable response was obtained with calcium carbide pellets, which effervesced as they slowly sank. In all cases the fish soon departed from the vessel and had to be rechummed with live bait before further tests could be carried out on them.

Three weekly hydrographic sections were executed in Kaiwi Channel as a continuation of the survey started during Cruise 11 of the Charles H. Gilbert and carried through during Cruise 12.

Completion of this cruise marks the end of the third month of weekly scouting trips in a research program planned by the Service's Pacific Oceanic Fishery Investigations and the Territory Division of Fish and Game to supply information for the ultimate expansion of the local tuna fishery. The program will be continued by the Hugh M. Smith. The cruises of the Charles H. Gilbert have involved, in addition to fish scouting, weekly investigations of the physical and chemical changes in the sea water which might be related to tuna abundance.

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"CHARLES H. GILBERT" SCOUTS FOR TUNA BETWEEN HAWAII AND WEST COAST (Cruise 14): In conjunction with returning the Charles H. Gilbert to the mainland for alterations, observations were made of surface fish schools between Hawaii and the West Coast. Trolling gear was used daily and water temperature data were collected with a bathythermograph and continuous recording thermometer. The vessel departed from Honolulu on July 16, and arrived at San Francisco on July 26.

Very few scattered birds were seen in the offshore area (50 miles from land) between Honolulu and San Francisco. These were mainly black-footed albatrosses, noted followers of ships. During the five hours of daylight after leaving Honolulu, only three bird flocks (all with tuna schools) were observed.

No tuna were caught during the ten days of trolling. Three mahimahi (C. hippurus) were caught, the last at 32° N. latitude on 135° W. longitude. The small catch may be partially attributed to the speed of the vessel (average for trip 9 knots) which was considerably above the optimum trolling speed of 6 to 6½ knots.

The continuous recording thermograph indicated the passing of about 4 to 6 "fronts." Two, and possibly three, were located in the area between 25°30' N. to 26°30' N. latitude on 147° W. to 145° W. longitude.

Generally the cruise was handicapped by moderately rough seas and complete overcast on 7 of the 9½ days, limiting the range of visibility.

The Charles H. Gilbert will be at a California shipyard for the balance of 1953.

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HYDROGRAPHIC AND BIOLOGICAL DATA AROUND HAWAIIAN ISLANDS COLLECTED BY "HUGH M. SMITH" (Cruise 21): A 2,500-mile, 69-station hydrographic cruise, part of the Service's Pacific Oceanic Fishery Investigations' program to study

conditions governing the Hawaiian skipjack tuna fishery, was completed on August 26 by the Service's research vessel Hugh M. Smith. Oceanographic and biological investigations were carried on in an area of 86,000 square miles surrounding the Hawaiian Islands; data were collected which will help to determine seasonal changes in local waters and aid in explaining fluctuations in the local skipjack catch.

Surface trolling and the direct observation of fish schools were also carried out, and in a further effort to aid the skipjack (aku) fishing fleet, reports of fish sightings were broadcast twice daily by short-wave radio.

The goal of this POFI program is to obtain sufficient understanding of the habits of the skipjack tuna and the oceanographic conditions influencing their distribution to permit expansion of the present localized and highly seasonal fishery.



States Get Over \$4 Million Federal Aid for Fish Restoration

An upsurge in the purchase of sport fishing equipment during fiscal year 1953 (ending June 30), attributed in part to the growing popularity of spinning tackle, has made the sum of \$4,299,916 in Federal Aid funds available for apportionment to the 48 states for sport fishery restoration projects during fiscal year 1954, the Secretary of the Interior announced recently. This is an increase of \$1,791,389 over last year's apportionment of \$2,508,527.

These Federal funds become available to the states under the terms of the Federal Aid in Fish Restoration Act of August 9, 1950, better known as the "Dingell-Johnson Act." This program, now in its third year of operation, is enabling the states to create new public fishing lakes, restore many unproductive waters, and put research findings to better use.

The revenue for the program comes from the 10 percent excise tax on fishing rods, creels, reels, and artificial lures, baits, and flies, paid by the manufacturers of those products. Collections from this source during the year ended June 30, 1953, totaled \$4,556,615. From this total is taken the annual apportionments of \$75,000 to Alaska, \$25,000 to Hawaii, and \$10,000 each to the Virgin Islands and Puerto Rico, and the cost of administering the act by the U. S. Fish and Wildlife Service.

To provide a fair distribution of Federal funds, each state's share is based on the relation of the number of its fishing license holders to the total in all States, and the ratio of each state's area (including coastal and Great Lakes waters) to the area of the entire country. The Act also states "that no State can receive less than one percent nor more than five percent of the total apportioned to all States." This provision allows the small States enough working capital to finance comparatively big projects, while the large States will be able to receive only the maximum amount. On this basis California, Michigan, and Minnesota are given the maximum apportionment of \$214,996 each, while Connecticut, Delaware, Louisiana, Maryland, Massachusetts, New Hampshire, New Jersey, Rhode Island, and Vermont will receive the minimum of \$42,999.

To obtain the benefits of the Federal grants, the states submit project proposals to the Fish and Wildlife Service. Acting for the Secretary of the Interior, the Service reviews these proposals to learn whether they are substantial in character and design, within the meaning of the Act. When a project is approved, the State game and fish departments proceed to carry out the plans, spending their own funds. The states then submit reimbursement claims for 75 percent of the costs of the project, either periodically or at the completion of the work. The remaining 25 percent of project expenditures is financed out of regular state funds. All equipment, lands, and structures become the property of the states. All project workers are hired by the states and are state employees.

Apportionments to the 48 states for fiscal year 1954 are as follows:

Alabama	\$52,945	Maine	\$45,421	Ohio	\$153,588
Arizona	68,625	Maryland	42,999	Oklahoma	99,180
Arkansas	78,425	Massachusetts ...	42,999	Oregon	92,832
California	214,996	Michigan	214,996	Pennsylvania ...	122,569
Colorado	103,031	Minnesota	214,996	Rhode Island ...	42,999
Connecticut	42,999	Mississippi	48,193	South Carolina ..	58,375
Delaware	42,999	Missouri	132,636	South Dakota ...	57,938
Florida	74,495	Montana	103,129	Tennessee	129,713
Georgia	82,803	Nebraska	68,502	Texas	191,741
Idaho	74,353	Nevada	60,690	Utah	58,996
Illinois	141,430	New Hampshire ..	42,999	Vermont	42,999
Indiana	100,096	New Jersey	42,999	Virginia	67,052
Iowa	86,684	New Mexico	75,550	Washington	101,620
Kansas	80,949	New York	146,347	West Virginia ...	44,865
Kentucky	79,195	North Carolina ...	76,016	Wisconsin	192,819
Louisiana	42,999	North Dakota	45,125	Wyoming	72,007



U. S. Customs Laws Regarding Landings of Fish From Joint U. S. -Japanese Fishing Operations

The U. S. Customs laws regarding landings of fishery products from joint U. S. - Japanese fishing operations were outlined by the Bureau of Customs in a recent letter to the State Department. The letter comments as follows:

"Reference is made to your memorandum... You ask for the comments of this Bureau with respect to certain of the questions raised... the Bureau's comments thereon are as follows:

"1. Under what conditions can processed fishery products, such as canned crab meat, be landed at an American port if this product has been caught and processed by a United States-Japanese joint fishing company incorporated in accordance with United States laws and regulations? Catcher boats (Japanese) and the mothership (American) would be under United States registry if permitted by United States regulations.

"Section 251, title 46, United States Code, restricts the American fisheries to vessels of the United States properly documented to engage in that trade. A vessel which is engaged in the catching of fish is engaged in the fisheries. Such a vessel also is engaged in the fisheries when it transports its catch to shore. In addition, where one vessel is used to catch the fish and another is used to transport the catch to shore, both vessels are engaged in the fisheries so long as both are under the same ownership or under the same complete control and management.

"The Bureau assumes, and will so treat the subject, that (1) it is intended that the operations of catching, processing, and transportation to port of fish products thereof are to be conducted by means of vessels which, if not under the same ownership, are to be under the same complete control and management, i. e., the said United States-Japanese joint fishing company, and (2) the mothership is to be so documented under the laws of the United States as to entitle it to engage in fishing. The latter would require the further assumption that the company is a citizen of the United States as defined in the documentation laws.

"Catcher boats of foreign build or ownership are not entitled to be documented for the American fisheries nor may any undocumented vessel engage in the American fishery except one of less than 5 net tons which is owned in the United States, or as hereafter stated in this paragraph. The catch of vessels of foreign build, flag, or ownership, except as hereafter stated in this paragraph, will not be regarded as products of an American fishery entitled to free entry under paragraph 1730 (a), Tariff Act of 1930, as amended. The employment by an American fishery of citizens of a foreign country who use their own foreign undocumented catcher vessels does not preclude free entry of their catches under paragraph 1730 (a), supra.

"If catcher boats built in the United States and owned by a citizen of the United States, as defined in section 802, title 46, United States Code, which may include a corporation organized and existing under the laws of the United States or of a State thereof, the president and managing directors of which are citizens and of which at least a controlling interest is vested in American citizens free from trust or fiduciary obligation in favor of alien interests, are documented under the United States flag, they will be entitled as vessels of the United States to engage in fishing and to land their catches or products thereof at a United States port as products of an American fishery entitled to free entry under the provisions of paragraph 1730 (a), Tariff Act of 1930, as amended. Further, the United States-flag mothership will be entitled to transship from the high seas such catches or the products processed therefrom at sea to a port of the United States as products of an American fishery likewise entitled to free entry.

"2. Is the entry of products caught and processed at sea by such enterprise subject to prohibition, restrictions, or import duties at the United States port? These products would be transported from the fishing ground to a United States port by the United States registered carrier.

"The tariff status of fish not entitled to free entry as products of an American fishery may be dutiable or entitled to free entry depending upon the type of fish and the processing to which it has been subjected. For instance, tuna fish, fresh or frozen, is entitled to free entry under the provisions of paragraph 1756, Tariff Act of 1930, while tuna, packed in air-tight containers (canned, not in oil), and tuna packed in oil (canned), are dutiable under paragraphs 718 (b) and 718 (a), respectively. Crab meat, including crab paste and crab sauce, packed in air-tight containers, is dutiable at the rate of 22½ per centum ad valorem under the provisions of paragraph 721 (a), Tariff Act of 1930.

"No quota is in effect at this time on crabs or tuna fish or canned products thereof. Groundfish, namely, cod, haddock, hake, pollock, cusk, and rosefish, excepting such as are entitled to free entry as products of an American fishery, are subject upon entry to tariff rate quotas."



Wholesale Prices, August 1953

WHOLESALE PRICES, AUGUST 1953: Continued light production of edible fishery products caused wholesale prices to again rise from July to August. The over-all edible fish and shellfish (fresh, frozen, and canned) wholesale index for August was 107.8 percent of the 1947-49 average (see table)--5.1 percent higher than in July and 8.0 percent above August 1952, the Bureau of Labor Statistics of the Department of Labor reports.

August prices for all varieties in the drawn, dressed, or whole finfish subgroup were higher than a month earlier, except western halibut and yellow pike at New York City which were lower. The largest increase (64.9 percent) was for large drawn off-shore haddock at Boston where continued light landings caused ex-vessel prices to rise. The largest price drop (8.3 percent) was for western halibut at New York City because the supply was liberal. Compared with August 1952, all items under this subgroup were priced higher this August except western halibut at New York and lake trout at Chicago which were quoted lower. The drawn, dressed, or whole finfish index for August was 19.9 percent higher than the previous month and 19 percent higher than in August 1952.



Prices in August for fresh processed fish and shellfish were down 2.1 percent principally due to a 12.7-percent drop in shrimp prices at New York City because shrimp

supplies had improved considerably. Offsetting the drop in shrimp prices, small haddock fillet prices at Boston were up 25.4 percent over a month earlier and 32.7 per-

Table 1 - Wholesale Average Prices and Revised Indexes for Edible Fish and Shellfish, August 1953 and Comparisons								
Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices/ (\$)		Indexes (1947-49 = 100)			
			Aug. 1953	July 1953	Aug. 1953	July 1953	June 1953	Aug. 1952
ALL FISH AND SHELLFISH (Fresh, Frozen, and Canned)					107.8	102.5	100.9	99.8
Fresh and Frozen Fishery Products:					115.9	107.2	103.2	102.2
<u>Drawn, Dressed, or Whole Finfish:</u>					121.1	101.0	97.4	101.8
Haddock, large, offshore, drawn, fresh:	Boston	lb.	.14	.09	144.0	87.3	87.1	95.5
Halibut, Western, 20/80 lbs., dressed, fresh or frozen	N.Y.C.	"	.31	.33	94.4	102.9	95.9	96.0
Salmon, king, lge. & med., dressed, fresh or frozen	"	"	.50	.49	112.1	110.7	108.4	108.5
Whitefish, mostly Lake Superior, drawn (dressed), fresh	Chicago	"	.47	.46	116.5	112.8	88.0	106.6
Whitefish, mostly Lake Erie pound or gill net, round, fresh	N.Y.C.	"	.55	.45	111.2	91.0	104.1	99.1
Lake trout, domestic, mostly No. 1, drawn (dressed), fresh	Chicago	"	.58	.53	117.8	107.6	106.5	119.9
Yellow pike, mostly Michigan (Lakes Michigan & Huron), round, fresh	N.Y.C.	"	.57	.61	132.5	143.6	105.5	123.1
<u>Processed, Fresh (Fish and Shellfish):</u>					113.5	115.9	111.9	103.0
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.35	.28	117.4	93.6	91.9	88.5
Shrimp, lge. (26-30 count), headless, fresh or frozen	N.Y.C.	"	.69	.79	109.1	124.9	117.0	88.5
Oysters, shucked, standards	Norfolk area	gal.	4.75	4.50	117.5	111.3	111.3	123.7
<u>Processed, Frozen (Fish and Shellfish):</u>					100.8	112.3	106.5	102.2
Fillets: Flounder (yellowtail), skinless, 10-lb. pkg.	Boston	lb.	.31	.31	108.7	108.7	108.7	124.4
Haddock, sml., skins on, 10-lb. cello-pack	"	"	.24	.22	89.3	82.8	79.0	83.7
Ocean perch, skins on, 10-lb. cello- pack	Gloucester	"	.20	.21	95.1	101.1	103.5	108.3
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	"	.69	.87	106.5	133.4	119.6	99.5
<u>Canned Fishery Products:</u>					95.9	95.5	97.5	96.3
Salmon, pink, No. 1 tall (16 oz.), 48 cans per case	Seattle	case	18.95	18.95	100.4	100.4	104.4	104.4
Tuna, light meat, solid pack, No. 1/2 tuna (7 oz.), 48 cans per case	Los Angeles	"	14.80	14.80	92.4	92.4	92.4	90.5
Sardines (pilchards), Calif., tomato pack, No. 1 oval (15 oz.), 48 cans per case	"	"	9.25	9.25	108.0	108.0	108.0	109.4
Sardines, Maine, keyless oil, No. 1/2 drawn (3 1/2 oz.), 100 cans per case	N.Y.C.	"	7.20	6.70	76.6	71.3	71.3	63.3

1/REPRESENT AVERAGE PRICES FOR ONE DAY (MONDAY OR TUESDAY) DURING THE WEEK IN WHICH THE 15TH OF THE MONTH OCCURS.

cent above a year ago. The fresh processed fish index this August was still 10.2 percent higher than for the same month in 1952.

The over-all frozen processed fish and shellfish index for August was 10.2 percent under July and 1.4 percent below a year ago. Shrimp prices tumbled (20.2 percent) again from the previous month due to increased production. Ocean perch fillet prices were also down (5.9 percent), while haddock fillets increased (7.9 percent) due to lighter landings at Boston. Frozen flounder fillets sold the same as in July. Compared with August 1952, prices of haddock fillets and shrimp were up while those for flounder fillets and ocean perch fillets were down.

Maine sardines, the only canned fishery product item to show a price change from July to August, went up 7.4 percent; all others remained the same. Compared with August 1952, pink salmon prices were lower, and tuna and Maine sardine quotations were higher.





International

UNITED NATIONS KOREAN RECONSTRUCTION AGENCY (UNKRA)

FISHING VESSELS SOUGHT: A total of 29 fishing vessels for the Republic of Korea were sought by UNKRA late this summer from shipbuilders and vessel owners in member countries, according to the Director of that Agency. The closing date for the bids was September 30, 1953.

The vessels sought were to be either new or used and of the following types:

Fourteen 75-ton wooden trawlers

Ten 30-ton purse seiners

Five 50-ton fish carriers

Bids were received from several of the United Nations countries which indicated wide variations in price and delivery. UNKRA later requested quotations from shipbuilding industries of interested countries, together with definite plans and specifications of their standard construction vessels to confirm in general with the size and type of boat indicated in the original specifications.

The general requirements for the wooden trawlers were: within 80 to 100 gross tons, powered with slow-turning four-cycle Diesel engines.

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ADVISORY COMMITTEE APPROVES KOREAN REHABILITATION PROGRAM: The five-nation Advisory Committee to the United Nations Korean Reconstruction Agency (UNKRA) on August 26 approved the Agency's \$130,000,000 program of long-range rehabilitation of Korea for the year ending June 30, 1954. The Committee is composed of Canada, India, the United Kingdom, the United States, and Uruguay. The '54 program, which is essentially an extension of the \$70,000,000 program undertaken by UNKRA last fiscal year, will emphasize capital investment projects designed to provide the bone and sinew of a viable Korean economy.

In the reconstruction and rehabilitation categories the major expenditures include \$18,000,000 for agriculture, forestry, and fisheries.

In the fields of agriculture, forestry, and fisheries, substantial sums will be spent to rehabilitate the fishing industry, and on irrigation, land reclamation, and river control.

The Advisory Committee, as in the past, plans to keep the program under review in order to insure flexibility and to enable it to consider modifications that may from time to time be found desirable, after consultations with the Government of the Republic of Korea and the United Nations Command, either to improve its effectiveness or to meet changing conditions in Korea.

INTER-AMERICAN TROPICAL TUNA COMMISSION

SAN DIEGO MEETING: A meeting of the Inter-American Tropical Tuna Commission held in San Diego, California, on August 14, was attended by commissioners from the

United States and Costa Rica--the two member nations--and by a representative of the Republic of Panama, which plans to join soon.

John L. Farley, new head of the U. S. Fish and Wildlife Service, attended as an observer. Richard S. Croker was present as observer for the California Department of Fish and Game, which is cooperating in the Commission's tropical Pacific tuna research program.

U. S. Commissioners were Lee F. Payne of Los Angeles, Eugene Bennett of San Francisco, and Gordon Sloan of Astoria, Oregon. Costa Rican commissioners were Jose L. Cardona-Cooper and Virgilio Aquiluz. Consul General Dias represented Panama.

Payne, member of the California Fish and Game Commission from Los Angeles, was elected president of the Commission.

WHALING

ANTARCTIC 1953/54 CATCH QUOTA REDUCED: The annual catch limitation for baleen whales during the 1953/54 Antarctic pelagic season will be reduced from 16,000 to 15,500 blue-whale units, subject to final approval by member nations of the International Whaling Commission, according to information published in the August 17 Foreign Crops and Markets of the Department of Agriculture. This action was taken during the fifth Annual Meeting of the Commission held at London, England, June 22-26, 1953, and was regarded as necessary to protect world whale stocks.

Other amendments to the Schedule annexed to the 1946 International Convention for the Regulation of Whaling, and approved by the Commission, included: (1) prohibiting the taking of blue whales in the Antarctic before January 16, 1954, and (2) permitting the taking of humpback whales in the Antarctic on February 1, 2, 3, 4. The opening date of the 1953/54 pelagic whaling season is January 2, 1954.

The Commission decided to convene its sixth meeting at Tokyo, Japan, on July 19, 1954.



Canada

BRITISH COLUMBIA PATROL VESSELS SCOUT FOR TUNA: British Columbia fishermen get quick word on the arrival of tuna in northern Pacific waters from the Government senior fisheries protection cruisers operating in the North Pacific area, reports the July 1953 Trade News, a Canadian Government publication. The patrol vessels--Laurier, Howay, and Kitimat--carry trolling gear to use for tuna if certain water conditions occur on their regular offshore patrols. This is one of the summer routines which Canadian Fisheries Department vessels undertake to make sure that British Columbia fishermen are quickly notified when tuna arrive in commercial quantities in northern Pacific waters.

When these vessels arrive at offshore coastal waters, the fishing fleet is advised and hundreds of radio-telephone receivers are tuned in each day to hear broadcasts from the fisheries patrol boats. Daily broadcasts on whether or not tuna have been found are given on the fishermen's wave band. Should there be a "strike," fishermen will be the first to know.

Only one or two boats have ever been built and equipped expressly for tuna fishing in British Columbia, but the halibut fleet (now for the most part idle) and the larger salmon trollers are ready at all times to put to sea in a hurry.

So far as the British Columbia fishing industry is concerned, albacore tuna are unpredictable. In the early history of the Province they were unknown to the fisheries.

This may have been due to the fact that in those early days the fishing vessels were not large and sturdy enough to venture far enough out into the Pacific waters where tuna schools occur. In the present century, design and construction of fishing vessels has steadily improved and fishermen have pushed farther and farther westward in their search for fish. In 1939 the first landings of tuna (284,000 pounds) went almost unheralded, but fishermen began to look for this good-selling variety from then on. Subsequent landings fluctuated and dwindled. The first big year came in 1945, when 1,428,000 pounds were caught off the B. C. coast and landed in B. C. ports. The catch exceeded the 2,000,000 pound mark in 1948 for the first time. The following year a record 2,230,000 pounds were landed. The tuna taken in 1948 and 1949 combined put a total of nearly a million dollars into the pockets of British Columbia fishermen, and the fishery was hailed as of ranking importance in the over-all value of the Province's fisheries.

But in the next and succeeding years the tuna fishery fell off abruptly. Since 1949 landings of tuna from catches made off the British Columbia coast have dropped to a trickle. Some of this variety is brought in by B. C. fishermen who have fished off the coasts of Washington, Oregon, and even California, and there have been considerable imports of Japanese-caught tuna for processing in B. C. canneries, but quantities caught directly offshore from the B. C. coast during the past three years have been almost negligible.

The albacore tuna is a "schooling" fish. Off the coast of British Columbia they have been taken relatively close to land and as far out as 100 miles. Apparently they are the offshoots of the big tuna runs which appear more or less steadily off California. Only when water temperatures and feed conditions are favorable do they seek the more northerly latitudes. The Department of Fisheries has never lost sight of the fact that in any year these conditions might recur.

Since the first landings of tuna in British Columbia, scientists of the Fisheries Research Board of Canada have added the variety to the list of fishes which receive careful and continuing biological study. At the Pacific Biological Station at Nanaimo, a useful store of knowledge has already accumulated; to this has been added knowledge of a practical kind resulting from actual fishing experiences contributed by the administrative branch of the fisheries in the Pacific area. It is now known that the albacore feeds on pelagic fishes and other small marine life, such surface food being present only in waters of certain fairly high temperatures. Masters of fishery protection cruisers have noted that sweeps of clear blue water and the presence of certain so-called "tuna birds" are an indication that "tuna conditions" may be favorable.

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FISHERMEN'S INDEMNITY FUND GOES INTO EFFECT: The Fishermen's Indemnity Fund, set up by the Canadian Government to enable fishermen to obtain protection against loss or serious damage to their vessels for a yearly premium of one percent, went into effect on July 6 in the Maritime Provinces and on July 13 in British Columbia, Quebec, and Newfoundland.

Fishermen are urged to take advantage of this plan, reports the June 1953 Trade News, a Canadian Government publication. It represents a long-term solution to the problem of compensation when losses occur and it permits a fisherman to retain his independence when misfortune strikes. A specially-trained group of Department of Fisheries officers will carry out necessary appraisals of vessels and assume other duties associated with the plan.

The Fishermen's Indemnity Fund provides protection for fishing vessels ranging in value from C\$250 to C\$7,500 for a premium of only one percent of the value of the vessel. It gives an indemnity of 60 percent of the appraised value in the case of total loss. In case of serious damage--over 30 percent of the appraised value--there will be an indemnity of 85 percent of the amount by which the repair bills are in excess of the 30 percent minimum.

A companion plan, covering lobster traps, will become effective in the Maritime Provinces at the opening of the fall lobster fishing season in Northumberland Strait.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, JULY 1953, P. 46.

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FISHING INDUSTRY LACKS SUFFICIENT COLD-STORAGE FACILITIES: Lack of cold-storage facilities is one of the greatest difficulties facing the Canadian fishing industry, the Fisheries Minister of New Brunswick told a group of southern New Brunswick fishermen at St. John on June 17.

Public cold-storage plants were being built through funds supplied by the National Harbours Board and Industrial Bank loans supplemented by Canadian Government subsidies, he said. In some cases, "outright gifts" of C\$10,000 were extended to fishermen's cooperatives which made the freezing facilities available to the public, reports the August 1953 Ice and Refrigeration.

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SASKATCHEWAN STUDIES GREATER FISHERY UTILIZATION OF ITS LAKES: The Saskatchewan Fisheries Branch is undertaking a detailed biological study of lakes in the Buffalo region of northwestern Saskatchewan, which will make possible higher utilization of these waters, the Saskatchewan Fisheries Director said recently.

A start on the study (expected to be completed in 1956) was made in the summer of 1952. Lakes under investigation are Peter Pond, Churchill, Frobisher, and Lac Ile-a-la-Crosse, reports the August 4 Saskatchewan News, a Saskatchewan Government publication.

The study will determine the safe annual limit of fish which may be harvested from the lakes, and particularly the maximum production figure for rough fish like tullibee.

Information gained from the study is needed for implementation of a management program "serving the best interests of both commercial fishermen and mink ranchers," states the Director. Because mink ranching is becoming an important industry in the area, he said, it is essential that production of species like tullibee, used as mink food, be increased.



Chile

TAX EXEMPTIONS AND OTHER BENEFITS GRANTED TO FISHERIES: In order to stimulate the Chilean fishing industry, various tax exemptions and other Government aids were granted the Chilean fisheries in Decree No. 208 of July 21, 1953, an August 6 U. S. Embassy dispatch from Santiago states.

In the first place, the Decree exempts the fishing industry for a period of ten years from the following taxes: a portion of the income tax; the excess-profits tax; certain taxes on vessels and equipment; the production tax on marine-oil manufacturers; and import duties on equipment and materials employed by the fishing industry. The Decree also establishes under the Ministry of Agriculture a Consultative Council for Fish and Game.

The most noteworthy of the privileges accorded under the Decree, from the United States point of view, is the exemption of fishing concerns from foreign exchange regulations on their exports. Thus, exporters of fish may hereafter convert foreign exchange into Chilean pesos at rates up to and including the free market curb rate. This will

amount in effect to a subsidy to the fishing industry, and should lead to greater exports of fish (particularly tuna) to the United States and other destinations.

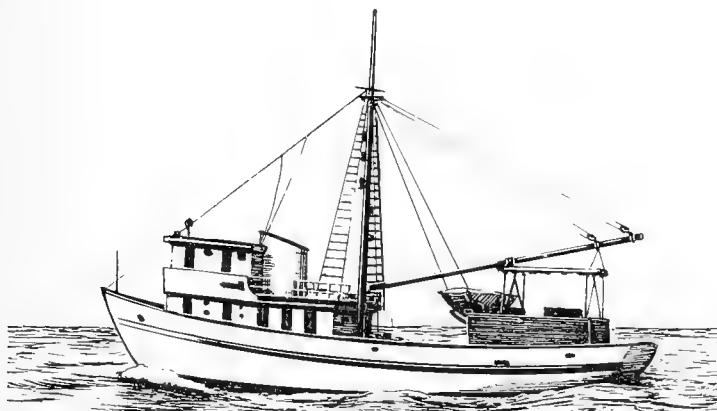


A CHILEAN TRAWLER

Other provisions of the Decree include Government aid in establishment of schools and housing for fishermen, measures to prevent pollution of waters, and more liberal regulations on the exploitation of shellfish beds.



Colombia



TYPE OF TUNA VESSEL BUILT BY SWEDISH SHIPYARD FOR COLOMBIAN FISH CANNERY.

NEW FISH CANNERY RECEIVES FIRST FISHING VESSEL FROM SWEDEN: Colombia's first fish cannery, not yet completed, recently received the first fishing vessel from Sweden, reports the August 8 Foreign Trade, a Canadian Government publication. The vessel was constructed in Sweden according to the specifications of the Colombian firm. The Swedish crew which brought the vessel across the Atlantic will remain in Colombia for some years under contract to the firm, and will train Colombian personnel to operate this vessel and others to follow.

Colombia's first fish cannery, situated in the Pacific port of Buenaventura, is expected to be completed by the end of 1953 at a cost of 5 million pesos (US\$2 million). The cannery is operated with all-Colombian capital. It is expected that several types of fish found in the Pacific coastal waters will be canned on a commercial basis once the plant begins to operate.



Denmark

U. S. GOOD MARKET FOR DANISH FISHERY PRODUCTS: The situation with regard to Danish exports of fishery products to the United States was reviewed recently by the Danish fishery attache stationed in New York, according to a report in Dansk Fiskeritidende (July 24, 1953), a Danish trade paper. The attache stated that the large increase in exports of Danish fillets had been dealt a hard blow by the drastic drop in cod fillet prices in the U. S., but that the situation had corrected itself insofar as cod was concerned and it was believed that a price increase would occur. He stressed the need for laying great weight on quality because the importers were very particular and competition was keen.

He also mentioned that Danish exporters must consider other packing methods more suited to U. S. tastes. The export of preserved fish, especially brisling, was thought to have possibilities. There was great interest in Danish fish meal. All fish meal offered had been sold.

The merchandising of Danish brook trout also had been satisfactory. In 1951 Denmark exported brook trout to the U. S. valued at Kr. 3, 300, 000 (US\$477, 000). In 1952 the exports increased to a value of Kr. 5, 500, 000 (US\$795, 000). Restaurants were the most important users of Danish brook trout, but there appeared to be a definite possibility to increase sales of brook trout by packing them in cartons.



Ecuador

NEW TUNA FIRM FORMED BY U. S. CITIZEN: A new company that will handle frozen tuna has been formed in Ecuador under the managership of a United States citizen, states an August 11 U. S. Embassy dispatch from Quito. The company has an authorized capital of 100, 000 sucres (US\$6, 600). It is now operating with a provisional permit to purchase fish only, but hopes to work out a contract with the government which will permit it to operate its own boats. The new company now has a freezer boat in Manta harbor which will be used in transporting the fish to Seattle, Washington.

The firm is now purchasing tuna at the port of Manta. Catches are rather small because the Manta fishermen are experiencing poor fishing conditions for this time of the year, reportedly due to the fish staying farther offshore than usual and beyond the range at which the inshore boats normally operate.

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FISHING FOR GOATFISH BY FOREIGN VESSELS BANNED OFF GALAPAGOS ISLANDS: Fishing for goatfish (cabrilla or bacalao^{1/}) by foreign-flag boats is henceforth prohibited in Ecuadoran territorial waters around the Galapagos Islands by virtue of Decree No. 950-d published in Official Register No. 283 of August 6, 1953. Reasons for this measure as given in the Decree are that fishing for goatfish in those waters has been too intensive; that the goatfish reserves are menaced with depletion; and that this important food item of the low-income diet might thus become insufficient for domestic consumption. The Decree also refers to the need for guaranteeing continuing employment to Ecuadoran fishermen engaged in fishing for goatfish.

^{1/}THE TERM "BACALAO" GENERALLY REFERS TO SALTED COD, BUT IS COMMONLY USED FOR ALL TYPES OF FISH THAT ARE SALTED.

In addition to prohibiting fishing for goatfish by foreign-flag vessels, the Decree provides that goatfish may not be exported from Ecuador unless the Minister of Economy grants a special license for such exportation after having determined that goatfish reserves are sufficient to satisfy domestic consumption needs, an August 21 U. S. Embassy dispatch from Quito states.



German Federal Republic

EAST GERMANY PLACES LARGE FISH ORDERS: The Food Section of the East German Government's Office of Import and Export has concluded an agreement with representatives of the fishing industry at Hamburg, Bremerhaven, Cuxhaven, and Kiel in West Germany, whereby fish valued at DM11,000,000 (US\$2,616,000) will be delivered from those ports to the Soviet Zone. Of this sum, Hamburg and Bremerhaven received orders totaling DM3,500,000 (US\$832,000) each; while the orders for fish from Cuxhaven and Kiel totaled DM3,000,000 (US\$713,000) and DM1,000,000 (US\$238,000), respectively. German officials feel that the amount ordered from Hamburg will be raised to DM7,000,000 (US\$1,664,000), and possibly may reach as high as DM15,000,000 (US\$3,567,000), a July 31 U. S. consular dispatch from Hamburg states.

An official of the Fish Section of the German Federal Food Office emphasized that fish shipments from these ports to the East are necessary, since the division of Germany has adversely affected the West German fishing industry. Before World War II, 40 percent of the fish caught at these ports was consumed in the Soviet Zone; whereas, in 1952 only 9,000 metric tons (1 percent of the total catch) were delivered to that zone.

To minimize the propaganda value of this trade and to insure that only reliable firms obtain export licenses, the West German Federal Government has established sales organizations which will control the export of fish to the Soviet Zone.



Greece

IMPORTS OF FISHERY PRODUCTS, 1952: Total imports of fishery products into Greece in 1952 amounted to 23,151 metric tons, reports Aleia, a Greek trade magazine. Cod (probably salted) was the leading item imported with a total of 12,462 tons; followed by herring (probably cured) 7,214 tons; and fresh fish 700 tons. Miscellaneous fishery products--salted, canned, fish roes, etc.--comprised the remaining 2,775 tons.

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SCOTTISH TRAWLER PURCHASED: The Scottish trawler Goodmar, one of the largest in the Aberdeen fishing fleet, has been purchased by a Greek firm, according to the July 18 issue of The Fishing News, a British trade magazine. The vessel sailed from Aberdeen on July 12 with an Aberdeen crew, who are under a six-months' contract, which might be renewed.

The vessel (renamed Jason by its Greek owner) has been purchased as an experiment. The captain and his crew are to teach the Greeks the Scottish method of trawling.

At Piraeus, Greece, the vessel will be overhauled and fitted with the latest type of refrigeration plant. This and other machinery was taken on board the vessel at Aberdeen along with modern trawling gear. Thereafter, the trawler will proceed to the west coast of Africa, where a type of bream is caught. After gutting and cleaning the fish, they will be quick-frozen and stored until a full catch has been obtained.

Iceland

TRADE AGREEMENT WITH RUSSIA INVOLVES LARGE QUANTITIES OF FISHERY PRODUCTS: A trade agreement between Iceland and the U.S.S.R. involving large quantities of fishery products was signed in Moscow on August 1, 1953, by the Chief of the Foreign Trade Section of the Icelandic Foreign Office, and representatives of the U.S.S.R. Ministry of Trade. The agreement is effective for one year beginning July 1, 1953, reports an August 4 U. S. Consular dispatch from Reykjavik.

The agreement provides for the exchange of the following commodities:

(1) 21,000 metric tons (about 46,300,000 pounds) of frozen Icelandic cod and ocean perch (presumably fillets) for 200,000 tons of Russian POL products, including 90,000 tons of gas oil, 80,000 tons of fuel oil, and 30,000 tons of motor gas. This is a straight barter.

(2) 75,000 bbls. of salted Faxa Bay herring (about 7,500 tons) with an optional 25,000 bbls. additional.

(3) 50,000 bbls. of salted North Coast herring (about 5,000 tons) with an optional 30,000 bbls. additional.

(4) 2,600 metric tons of frozen Faxa Bay herring, with an optional 3,000 tons additional, on a barter basis for rye meal, rice, potato starch, reinforcing bars, galvanized and black pipe, and cement.

The above-listed Icelandic imports represent the country's annual requirements in most cases. The total value of trade is estimated at about I. Kr. 180 million (US\$11 million).

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LOANS FROM INTERNATIONAL BANK TO DEVELOP AGRICULTURE AND LESSEN DEPENDENCE ON FISHERIES: The International Bank for Reconstruction and Development on September 4 made two loans for Iceland in European currencies, according to a September 4 release from that organization. One (in various currencies equivalent to US\$1,350,000) will assist in carrying forward a program of agricultural development. The other of £90,000 (US\$252,000) is to finance the construction of a building to house radio transmitter equipment serving North Atlantic air traffic.

The agricultural loan, like the one made in 1951, is to further a program begun in 1951 to increase Iceland's agricultural production. The purpose of the program is to restore agriculture to its former place of importance and lessen Iceland's dependence on the fishing industry. The program aims to increase agricultural production 50 percent by 1965, and should improve Iceland's foreign exchange position considerably through import savings and export earnings.



India

FISHERIES DEVELOPMENTS: Experiments in deep-sea fishing carried out by the Government of India off the West Coast, and by the West Bengal Government in the Bay of Bengal, indicate that this type of fishing on a commercial basis is economically feasible, and can contribute substantially to the country's food resources. A 250-ton Japanese trawler brought in by the Government for exploratory work in the Arabian Sea made a record catch this season and completed operations with a net profit. Now that the financial soundness of the venture has been demonstrated, the Government hopes that Indian private enterprise will be encouraged to enter the field on its own or in collaboration with Japanese fishing interests, reports the August 22 Foreign Trade, a Canadian Government publication.

The Deep-Sea Fishing Station at Bombay is employing two 100-ton trawlers to drag the ocean bed and two smaller "reckie" boats for surface and mid-water fishing. These vessels will gather information on fishing conditions off the West Coast--such as the types and numbers of fish available at different seasons, the depths at which they are found, and the kind of equipment required to catch them--and will train fishermen in the proper techniques. On the average, 75 percent of the catch made by the trawlers, operating mainly within the 40-fathom limit, consisted of fish of high food value, including dara, ghol, mullets, pomfret, and eels. The results of the surface and mid-water fishing have been less successful, largely because of inexperience, and the Government has arranged to bring a master fisherman from the United Kingdom to supervise operations during the coming season.

The catches made in the Bay of Bengal by two trawlers purchased from Denmark by the West Bengal Government were also encouraging. The trawlers were manned by Danish crews who will eventually be replaced by Indians. The three Japanese bull-trawlers which the West Bengal and Indian Government will soon acquire in partnership will materially expand exploration in the waters off the East Coast.

Two new cold-storage plants, similar to the large Central Government facilities already in operation in Bombay, are being built by the Madras Government at the West Coast ports of Mangalore and Calicut. Work is also progressing on ten small ice factories and cold-storage plants which are being built with foreign assistance in the states of Saurashtra, Bombay, Cochín, Madras, and Orissa.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, APRIL 1953, P. 45.



Japan

CANNED TUNA EXPORT PRICES: Increased prices of Japanese canned tuna (white meat, albacore) for export were recently announced by the Tokyo Canned Tuna Sales Company, the main outlet for exporters selling principally to the United States market. No changes were announced for light-meat tuna (skipjack and yellowfin), an August 12 U. S. Embassy dispatch from Tokyo reports.

The new prices as compared with the old prices are listed below:

Item	Type of pack	New prices ^{1/}		Old prices	
	Case and can size	In brine	In oil	In brine	In oil
..... (US\$ per case)					
White-meat tuna (albacore) solid	48 3½-oz. cans	5.85	5.95	5.70	5.80
Do.	48 7-oz. cans	9.90	10.00	9.60	9.70
Do.	24 13-oz. cans	9.00	9.10	8.70	8.80
Do.	6 4.4-lb. cans	10.50	10.60	10.20	10.30
Do. flakes	48 6½-oz. cans	7.90	8.00	7.70	7.80

^{1/}F.O.B. JAPAN, INCLUDING 2-PERCENT COMMISSION FOR BROKERS.

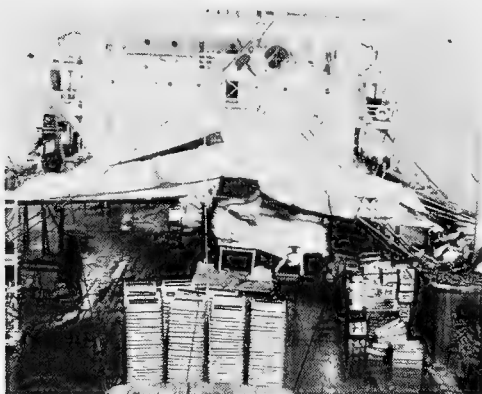
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TUNA EXPORT LEGISLATION MAKES NO PROGRESS: The proposed bills which would favor the export of canned over frozen tuna did not make any headway in the session of the Diet which adjourned August 10. Consideration of legislation to encourage the exportation of marine products (including tuna) may be discussed at the next ordinary session of the Diet scheduled to begin in December, reports an August 12 U. S. Embassy dispatch from Tokyo.

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TUNA MOTHERSHIP EXPEDITION REPORTS GOOD CATCHES: A recent report from the tuna mothership fleet operating off Solomon Islands in the Pacific indicates good catches, comparing favorably with those of last year, an August 12 U. S. Embassy

dispatch from Tokyo states. The catch for the first month of operation ending July 10 amounted to over 4.6 million pounds or 37 percent of the catch target of 1.2 bil-



LOOKING AFT TOWARDS THE WORKING AREA ABOARD A TUNA MOTHERSHIP. PANS IN THE FOREGROUND ARE FOR HOLDING FILLETS.

Catch (to July 10) of Japanese 1953 Tuna Mothership Expedition Operating off Solomon Islands		
Species	Number of fish	Lbs.
Received:		
Yellowfin tuna	34,658	2,541,371
Other tuna	10,397	530,876
Swordfish	7,927	940,828
Shark	7,607	627,536
Other fish	284	7,253
Total	60,873	4,647,864
Processed:		
Yellowfin tuna, round	25,256	1,761,816
Yellowfin tuna, fillets		495,886
Other tuna, fillets ...		409,241
Swordfish, fillets ...		541,875
Shark, fillets		445,141
Other fish, round ...		7,335
Total		3,661,294

lion pounds by mid-September (see table). The position of the mothership in mid-July was approximately 7°31' S. latitude and 160°03' E. longitude. The fleet is operating with 1 carrier (11,224 gross tons), 30 catcher boats (average 130 gross tons each), and 2 small carriers (average 1,000 gross tons each).

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BERING SEA CRAB EXPEDITION COMPLETES SUCCESSFUL SEASON: The Japanese crab expedition to the Bering Sea completed its fishing in Bristol Bay on August 16, ending a successful season, according to a recent U. S. Embassy dispatch from Tokyo. Preliminary data indicate a total production of 58,240 cases (48 cans of 6½ ounces each), consisting of 47,858 cases of first-grade and 10,382 of third-grade crab meat. The target catch was originally set by the Japanese Government (April 1953) at 50,000 cases, but because of good fishing was raised to 57,000 cases on July 8. The excess of 1,240 cases is reported to represent the catch of the gear in the water at the time the canning operation aboard the mothership reached the limit of 57,000 cases.

Most of the canned crab meat is expected to be exported to the United States. Total Japanese exports of this product in 1952 amounted to 111,492 cases, consisting of 85,236 cases of king crab and 26,256 cases of other crab. Of this total, 95,961 cases (84 percent) was shipped to the United States.

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NORTH PACIFIC SALMON EXPEDITION CATCH EXCEEDS TARGET: The Japanese salmon expedition (consisting of three fleets) to the North Pacific resulted in a catch of approximately 7,700,573 salmon

Japanese North Pacific Salmon Expedition Catch by Species, 1953	
Species	Number of Fish
Red	1,580,107
Chum	2,707,363
Pink	3,064,439
Silver	340,611
King	8,053
Total	7,700,573

(see table), 38 percent above the target set by the Japanese Government, reports a recent U. S. Embassy dispatch from Tokyo. The expedition left the grounds August 10-12.

Salmon was canned on the fishing grounds by one of the three fleets aboard the *Meisei Maru*, the only mothership equipped for this operation. Against a target of 40,000 cases,

preliminary data indicate a pack of 37,427 cases (48 cans of 7 ounces each), consisting of 21,450 cases of red and 16,977 cases of pink salmon. Canning of some of the catch of the other two fleets will be done at shore facilities in Japan--about 40,000 cases (10,000 cases of red and 30,000 cases of pink) may be packed.

Much of the salmon catch is expected to be consumed in the Japanese domestic market as frozen, salted, and canned. Exporters are showing interest in increasing exports of canned salmon despite high prices being quoted in the Japanese domestic market. With the recent relaxation of restrictions on imports from Japan by Australia, expectations are for expanded exports of canned salmon to that country. Tokyo firms have reportedly concluded a contract to ship 20,000 cases (96 cans of 3½ ounces each) to Australia in 1953 at US\$29 per case for red and US\$23 for pink salmon, f. o. b. Japan. Total Japanese exports of canned salmon to all countries in 1952 totaled 38,210 cases (48 cans of 7 ounces each), mostly to Ireland and the Netherlands; Australia received 2,072 cases. Shipments to United States and territories were to Guam only (1,090 cases).



Liberia

FAO EXPERTS AID FISHERIES: Expansion of the Liberian fisheries on the Atlantic Coast might now be possible through technical assistance provided by Food and Agriculture Organization (FAO) experts, reports an August bulletin from that agency. FAO has one expert on fishing craft and gear, and another working on fish processing. The Liberian assistants assigned to the FAO project were given instruction at a practical fisheries course started by FAO experts. They studied navigation, use and repair of oil engines, fish processing, wire trap making, and net making and repair.

With the Liberian assistants they have trained, and using their motorized canoe, the FAO motorboat, and nets and other gear manufactured in their school, the FAO men have proved that they can trawl as far as ten miles out and bring in large catches of a wide variety of fish and shellfish. They have sold most of this at low prices--15 cents a pound--to consumers in Monrovia who could not previously afford to eat fish.

They have also demonstrated that it is feasible to process good quality smoked fish which stays in good condition long enough for transport and marketing in the interior.



Norway

FROZEN FILLETS STORED AT TRONDHEIM FOR EXPORT TO UNITED STATES: Recently a contract was signed between a Trondheim (central Norway) cold-storage firm and the large Norwegian fish producing corporation in north Norway, whereby large quantities of frozen fish fillets from north Norway will be shipped to Trondheim and await shipment to the United States. In order to meet the stepped-up requirements, the Trondheim company is building new facilities that will double its cold-storage capacity, according to an August 13 release from the Norwegian Information Service.

This new era in exporting fillets was initiated on July 14 when a 12,000-ton U. S. vessel (Mormacmail) sailed with a cargo of 130 metric tons of frozen fish fillets and 400 tons of herring meal and canned fish for the United States market. Late in July, another vessel (Lyngenfjord) sailed with a large consignment of frozen fish fillets; and on August 13 a third vessel (Thalatta) was due to sail to the United States with frozen fillets.

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BARENTS SEA COD INVESTIGATIONS: An investigation of the food conditions of cod in the Barents Sea in the Arctic Ocean northeast of Norway is being made by the Norwegian fisheries research vessel G. O. Sars, reports the Norwegian Information Service in a September 3 release. The vessel left the port of Tromso recently. The expedition is headed by a consultant of the Norwegian Fisheries Directorate and two other scientists.

Interviewed by the newspaper Tromso, the consultant observed that a good deal was known about the mature Arctic-Norwegian cod. It has been established that when the cod are 8 to 10 years old they leave the Barents Sea to spawn on the banks off North Norway, thus providing the basis for the important Lofoten cod fisheries. What the present expedition will look into are the conditions of the cod before they start spawning. As the Lofoten cod shoals fluctuate in size from year to year, Norwegian scientists are inclined to believe that these variations are related to conditions prevailing in the Barents Sea.

In an effort to throw light on this moot subject, the researchers aboard G. O. Sars plan to study the food supplies available to the Arctic-Norwegian cod, as well as other factors that could influence the annual fish migrations to the Lofoten banks. They also hope to determine how far north the cod go in the Barents Sea. To do so, they will measure the temperature and the salt content of the ocean water all the way to Franz Josef Land. It has previously been observed that cod are found only in water with a temperature of over 35° F.

* * * * *

BRISLING SARDINE PACK UP: Norwegian canneries this season as of July 25 had packed 439,450 cases of brisling sardines, an increase of 45 percent when compared with the 302,390 cases packed by the same date in 1952, an August 20 release from the Norwegian Information Service reports.

* * * * *

TUNA CATCH POOR: Only about 600 metric tons of tuna had been landed in Norway toward the end of July, or about one-tenth as much as at the same time in 1952, according to a report in Fiskaren (July 29), a Norwegian trade paper. The quality of the fish landed was good and sales contracts were being sought in the United States and in Italy.



Panama

FISHING REGULATIONS AMENDED: The Panamanian Minister of Agriculture on August 5 issued Decree 172 effective immediately, which: (1) prohibits commercial fishing "within waters of the continental shelf of the Republic" except by persons possessing a second-class commercial license; (2) "until the Executive Organ dictates an organic law on this subject, commercial fishing will be permitted only by" Panamanian-built vessels, but the vessels already imported for this purpose are excepted from this provision. The preamble states that the purpose of the Decree is to protect national marine life against exploitation and to develop local shipbuilding. Bait fishing by ocean-going vessels is not affected by the Decree and will be governed by special provisions, an August 6 U. S. Embassy dispatch from Panama City states.

Significantly, the Decree implements the Panamanian claim to the continental shelf. Also, for the first time a specified commercial license is required (costing US\$10 yearly) which can be bought only by Panamanian and American citizens.

* * * * *

COMMERCIAL FISHING ESTABLISHES RECORD YEAR: During 1952 a total of 4,527,060 pounds of fish and shellfish, with a value of \$1,051,999, was taken from the Gulf of Panama (Pacific side) as revealed by official data supplied by the Panamanian Office of Statistics. During 1951, a total of 1,892,075 pounds was caught, valued at \$373,100, reports a recent U. S. Embassy dispatch from Panama.



Peru

SOUTH PACIFIC TERRITORIAL WATERS DECLARATION APPROVED: Official approval on the part of the Peruvian Government of the Declaration on territorial waters signed in the First Conference on Exploitation and Conservation of the Maritime Resources of the South Pacific, held at Santiago, Chile, in August 1952, was given in a Supreme Resolution dated April 11, 1953, and first published in the official gazette, El Peruano, on May 15, 1953.

By the act signed at the Conference, the governments of Chile, Ecuador, and Peru proclaim exclusive sovereignty and jurisdiction over the adjacent seas extending to a minimum distance of 200 marine miles from their respective coasts, as well as over the land and subsoil corresponding to this zone. The Governments also agreed to subscribe to agreements for the regulation and protection of the natural resources in these waters, a June 16 American Embassy dispatch from Lima points out.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, MARCH 1953, P. 42.



Spain

SHRIMP SHIPPED TO U. S.: For the first time there has been a shipment of frozen shrimp from Spain to the United States, reports the U. S. Consulate at Seville. Late in June a firm in Huelva shipped five tons of frozen shrimp to a Puerto Rico firm for reshipment to the continental United States. It is predicted that the shipment of frozen shrimp from Spain to the United States will become an important item in future trade. Negotiations are now under way to supply large quantities of shrimp from the new freezing plant in Cadiz which is due to open soon.



Thailand

TILAPIA CULTURE: Tilapia fingerlings (500,000 fish) are being distributed every month to Thai Government fisheries stations, state-owned waters, and to the ponds and irrigated rice fields of small farmers in Thailand. This is the result of a joint effort of the Thai Government and the Food and Agriculture Organization of the United Nations (FAO), both of whom are concerned to give the people of Thailand a health-building diet, an August bulletin from FAO reports.



THAI INLAND FISHERMEN HAULING IN A SEINE NET.



FAO EXPERT ASSISTED BY THAI TECHNICIANS PACKING FISH FINGERLINGS IN SPECIALLY CONSTRUCTED OXYGEN FISH SUPPLY CONTAINERS FOR LONG DISTANCE TRANSPORT, THUS REDUCING MORTALITY.

The people of Thailand have not been undernourished; but they have been malnourished, because their basic diet was not filled out with enough proteins. Tilapia, introduced into Thailand by the FAO, and multiplying at a phenomenal rate, is rapidly becoming the standard protein supplement to the standard carbohydrate diet of the ordinary people of Thailand.

The farmers of Thailand call the Tilapia "The mad fish of the Orient. The fish that eats like mad, grows like mad, and reproduces like mad." Tilapia are mouth breeders. They protect their eggs during the incubation period and their young in moments of danger by guarding them in their mouths.



Union of South Africa

CANNED FISH EXPORTS TO U. S. INCREASED: Approximately 300,000 cases (48 1-pound cans) of canned pilchard and jack mackerel (maasbankers) have been sold for delivery to the United States, reports an August 11 U. S. consular dispatch from Cape Town. This represents about 35 percent of the 1952 production of canned pilchards and maasbankers.

Because of the disappearance of the California sardine, these purchases of canned fish are to be used primarily by United States firms to maintain their positions in various world markets. In fact, it is believed that most of the 300,000 cases were purchased by a representative of one of the largest of the California fish canning companies.

South African fish canners are also taking an interest in the Philippine market where the absence of California sardines has created a strong demand for the South African product.

* * * * *

FISHERMEN'S TRAINING SCHOOL: Beginning in 1954, young men wishing to become fishermen will receive a special training course at the South African Naval Gymnasium at Saldanha Bay. This course will be open to medically fit Europeans between the ages of 16 and 22 possessing a Standard VII certificate. Training will take a year and 30 trainees will be admitted in 1954, reports the July 1953 South African Shipping News and Fishing Industry Review.

This vocational training scheme represents the culmination of more than 20 years of effort by Dr. Cecil von Bonde and other leaders in the fishing industry to develop schools for fishermen.

The practical or vocational school would provide competent and well-trained fishermen for the vessels. The trainees would receive instruction in navigation, seamanship, engine maintenance, signalling, tending nets, and in several other aspects of fishing.

In a longer and more detailed schooling, young men could be trained for work ashore. The latter would take a comprehensive course which would include such subjects as fisheries science, plant operation, accounting, fisheries economics, etc. This fisheries school or university course would correspond to the instruction provided in the various agricultural colleges.

The detailed course is still to come, but beginning in 1955 the South African fishing industry can count on a trained nucleus of young fishermen. Not only will they have been well-grounded in fishing practice, but they should also show the benefits of a full year under naval discipline; for the 30 trainees are to be accepted as full-time cadets for one year in the South African Navy.

This will provide the Navy with a valuable reservoir of trained men for use in an emergency. The 30 fishing trainees are to receive free board and lodging at the Gymnasium, they will get free medical treatment, free uniforms, and, instead of having to pay for their training, they will receive Navy rates of pay for full-time service. In addition, the fishing course exempts the recruit from normal part-time military training.



United Kingdom

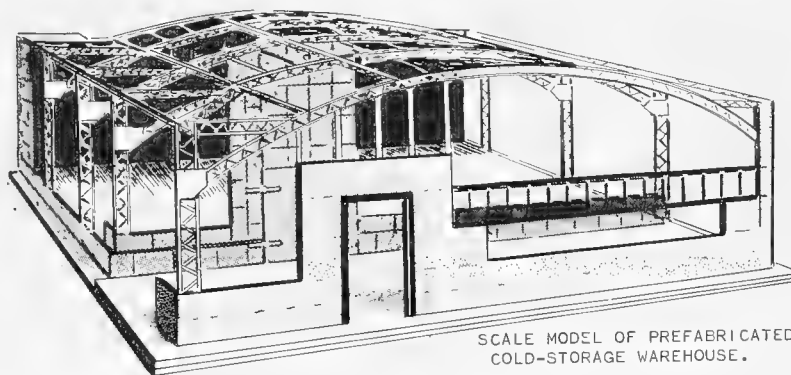
WHITE FISH AUTHORITY TO SURVEY OPERATING COSTS OF DISTANT-WATER TRAWLERS: At the suggestion of trawler owners in Hull, Grimsby, and Fleetwood, the "profit and loss" accounts of nearly 300 distant-water trawlers are to be examined as part of a nationwide survey by the White Fish Authority (WFA) into the operating costs of Britain's fish industry, states the August 15 *Fish Trades Gazette*, a British trade magazine. The trawler check will cover the two years ending September 30 this year, and when completed will give the WFA a complete picture of the trading operations of an important section of the fish-catching industry--a section that catches half the white fish landed in the United Kingdom.

The three-page questionnaire to be sent to trawler owners represents the first attempt by the WFA at tabulating the accounts of the distant-water section of the industry, for the trawlers concerned do not come within the Authority's subsidy scheme.

Owners will be asked for each trawler to give the value of landings during the last two years, the number of voyages made, and the number of days spent at sea. Questions on expenses will include the cost of fuel, provisions, repairs and gear, marine insurance, and the wages of officers and men.

* * * * *

PREFABRICATED REFRIGERATED WAREHOUSES: A London firm is soon to market a prefabricated refrigerated warehouse, reports the July 25 issue of *The Fishing News*, a British trade magazine. It is claimed that this type warehouse will cut the capital cost in half as compared with the conventional cold-storage buildings, and also greatly reduce labor costs. A scale model of this warehouse was exhibited in London recently and attracted much attention from refrigeration experts, representatives of the fish industry, and others interested in cold storage.



SCALE MODEL OF PREFABRICATED
COLD-STORAGE WAREHOUSE.

The construction of the warehouse is simplified by covering the roof with continuous aluminum sheeting, secured by clip-on rolls. It is claimed that this method eliminated horizontal joints and consequent leakage.

It was also claimed that the high cost of manual labor in loading and unloading-- (a serious economic problem to all large-scale cold-storage operators)-- was greatly reduced in the new prefabricated design by its clear, pillarless working space, some 18 ft. high, in which it is possible to operate an electric pallet-stacking truck handling large quantities of goods with only one operator. At the same time, the high volume-

to-area of insulation ratio reduced capital cost and the power consumption of the refrigeration plant; while because of the design of the warehouse the refrigeration plant itself necessitated less cost.

The storage plant costs £30,000 (US\$84,000) without the refrigeration plant, and is to be supplied--with its own engineroom and reception bay--in standard parts, ready for quick and simple erection. The inside dimensions of the smallest unit are 65 x 62 x 18 feet, providing 73,000 cubic feet of storage space. Larger units with a clear span of up to 200 feet, by any length, will be supplied. The engineroom section can be made larger to hold other processing equipment.

Another model was shown also. This is a pipe-frame cold-storage warehouse and smaller than the other type described above. In this unit no structural steel is used, the building frame being made from standard refrigeration pipes. This design is not yet commercially available, but it is proposed to make it available in the form of standard truss sections (20, 30, or 40 feet wide) to be assembled in units to form plants of varying widths and lengths. Insulation will be provided by standardized insulation blocks to form an envelope over the building. Besides saving labor, this warehouse is estimated to save 60 percent in capital cost.

Also on show was an insulated transit container, described as the cheapest and lightest made, and suitable for shipping frozen fish. The medium size ($1\frac{1}{2}$ cubic feet) weighs only 32 pounds. The container is very durable, and its cost ranges from £5 10s. (US\$15.40) for the 1-cubic foot size to £9 10s. (US\$26.60) for the $2\frac{1}{4}$ -cubic foot size.

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UNDERWATER TELEVISION CAMERA VIEWS SEA BOTTOM: Trials with underwater television have provided new information about the sea floor, says the British Institute of Oceanography, giving details on equipment developed by the Admiralty on the Royal Research ship Discovery II. The trials show that the technique could develop into a valuable oceanographical instrument, especially if used in conjunction with other gear, reports the July 25 issue of the Fishing News, a British trade magazine.

The camera was first installed on the Discovery II last summer. A modified TV receiver was used as the main monitor, and pictures displayed on the camera control-unit monitor were photographed when required by a camera attached to the unit. The unit in its present form is cumbersome, however, and its scope is limited by its weight, making it unsafe to use except in calm water, and difficult to lower to any great depth. But these objections are likely to be overcome.

So far the television has been most successful in views of the sea bottom, and the Institute regards the pictures taken as of permanent value. Shoals of fish have been seen on several occasions; also plankton organism--these mostly as spots of light, though occasionally the type of organism could be identified.

Observations on the sea bottom were made in about 33 fathoms off Falmouth, in 60 fathoms near the mouth of the English Channel, and in about 80 fathoms near the edge of the continental slope; also off Portugal on the Gettysburg Bank, and on the rocky sea bottom around the Azores.

* * * * *

RUSSIA ORDERS TRAWLERS: Orders for the building of fishing trawlers for Russia have been received by two British firms--one in Aberdeen and the other in Lowestoft, reports the August 29 issue of The Fishing News, a British trade magazine. The proposed orders are under consideration by the Board of Trade, said an official of the Board "because it is always a feasible argument that fishing trawlers could be converted to minesweepers."

This statement followed questions sent to the President of the Board of Trade by a member of Parliament who said he was told by the Aberdeen Trades and Labour Council that the Russian Government had made approaches "to a number of British shipbuilding firms with a view to placing large orders for building trawlers and fish factoryships." He asked whether it was true that difficulties had been placed in the way of acceptance. He urged the Minister to take steps to remove such difficulties "in the interests of international trade and employment in British shipbuilding yards."

Later information indicates that 40 trawlers and fish factoryships worth about £8,000,000 (US\$22,400,000) are involved. Russia needs these vessels to develop its fishing industry. A British Admiralty committee is considering whether the vessels could be converted into minesweepers; the availability of steel; and effect of the orders on other vital shipbuilding.

* * * * *

SCOTTISH PORT TO TRAIN FISH WORKERS: The Aberdeen and North-East Regional Advisory Council for Technical Education and Aberdeen's fishing industry have completed plans for training young men and women in the fishery products distribution field. The courses will start in September with a class of 20, functioning under the local authority, reports the July 25 issue of The Fishing News, a British trade magazine.

Employers will release the students from their work on two afternoons each week. One of the afternoons will be given over to theoretical work, and the other to practical. The curriculum will include such subjects as hygiene, background knowledge of the industry, fresh fish preparation and packing for distribution by rail and road, curing and other processing methods, and work of the Torry Research Station on the preservation of fish.



Editorial Assistant--Ruth V. Keefe

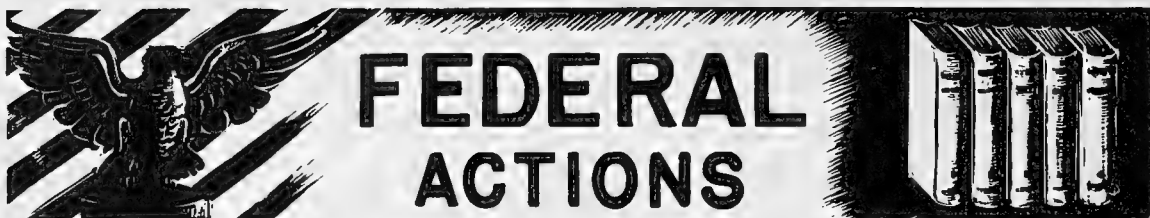
Illustrator--Gustaf T. Sundstrom

Compositors--Jean Zalevsky, Betty Coakley, Alma Greene, & Kathlyn Brophy

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Photograph Credits: Page by page, the following list gives the source or photographer for each photograph in this issue. Photographs on pages not mentioned were obtained from the Service's file and the photographers are unknown.

Cover, pp. 8 & 9--Staff of the Exploratory Fishing and Gear Development Section at Seattle, Wash.; pp. 51 & 59--Food and Agriculture Organization, Rome, Italy.



Department of Health, Education, and Welfare
FOOD AND DRUG ADMINISTRATION

HEARING ON PACIFIC OYSTER STANDARDS: A hearing to amend definitions and standards of identity for raw Pacific oysters was held on October 21, 1953, in Washington, D. C., and was announced in the September 18 *Federal Register*. The hearing was called by the Secretary of Health, Education, and Welfare, and held for the purpose of receiving evidence on proposals of the Pacific Coast Oyster Growers Association to amend the standards of identity for Pacific oysters. Evidence was restricted to testimony and exhibits relevant and material to the proposals.

The proposals would amend Sections 36.17 to 36.20, inclusive, of the regulations, which fixed and established definitions and standards of identity for raw Pacific oysters. As amended the section would provide that:

1. Large Pacific oysters, large raw Pacific oysters, large shucked Pacific oysters, are of the species *Ostrea gigas* and conform to the definitions and standards of identity prescribed for oysters by Sections 36.10 and are of such size that 1 gallon contains not more than 64 oysters, and the largest oyster in the container is not more than twice the weight of the smallest oyster therein.
2. Medium Pacific oysters... and are of such size that 1 gallon contains more than 64 oysters and not more than 96 oysters, and the largest oyster in the container is not more than twice the weight of the smallest oyster therein.
3. Small Pacific oysters... and are of such size that 1 gallon contains more than 96 oysters and not more than 144 oysters, and the largest oyster in the container is not more than twice the weight of the smallest oyster therein.
4. Extra small Pacific oysters... and are of such size that 1 gallon contains more than 144 oysters, and the largest oyster in the container is not more than twice the weight of the smallest oyster therein.

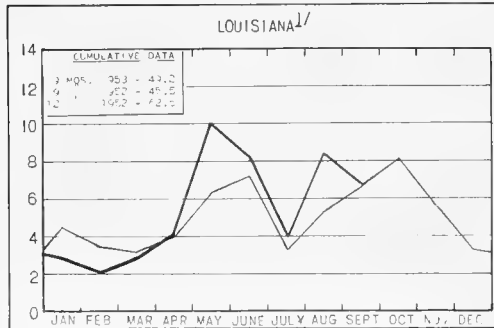
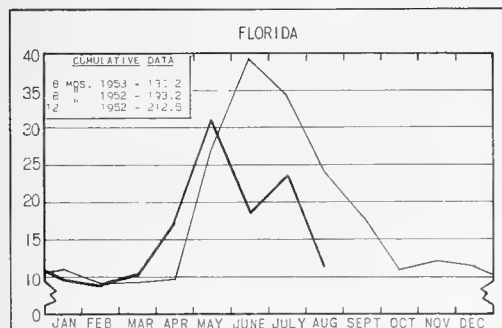
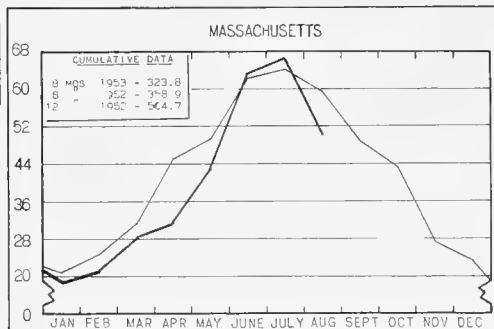
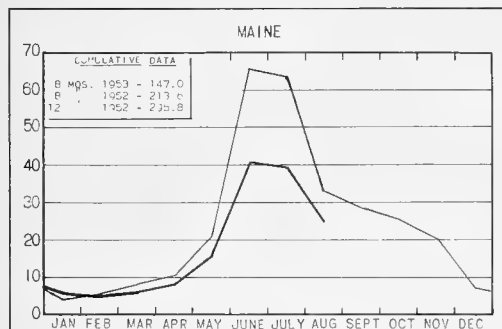
The proposed amendments for consideration at the hearing are subject to adoption, rejection, or modification by the Secretary of Health, Education, and Welfare, in whole or in part, as the evidence adduced at the hearing may require.



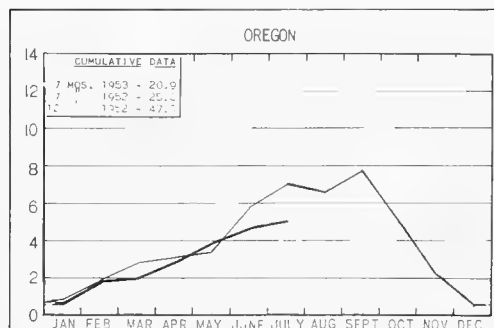
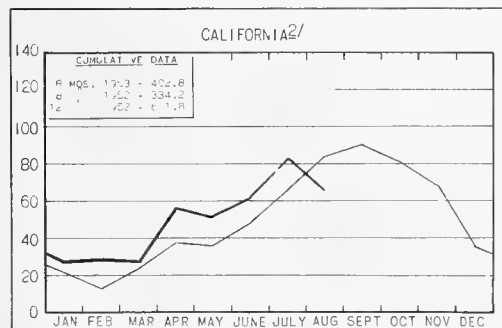
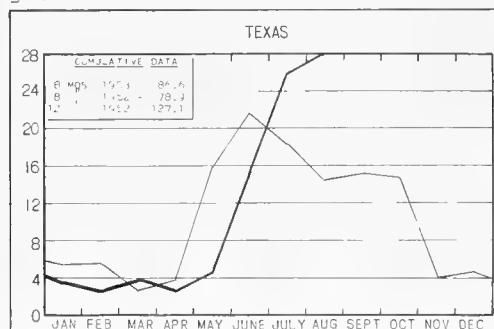
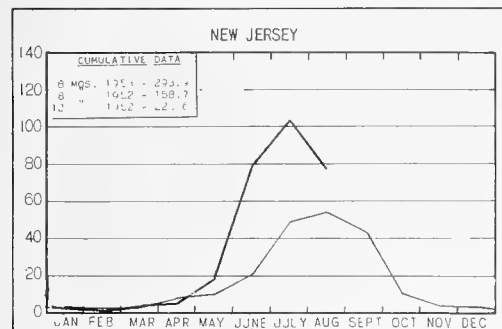


CHART 1 - FISHERY LANDINGS for SELECTED STATES

In Millions of Pounds



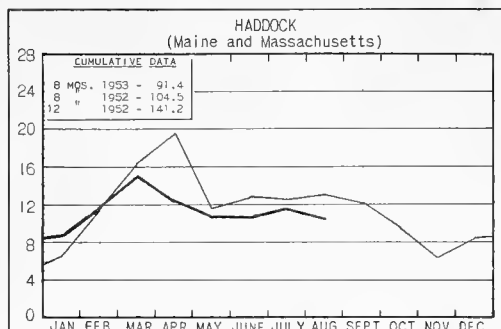
^{1/}ONLY PARTIAL--INCLUDES LANDINGS AT PRINCIPAL PORTS.



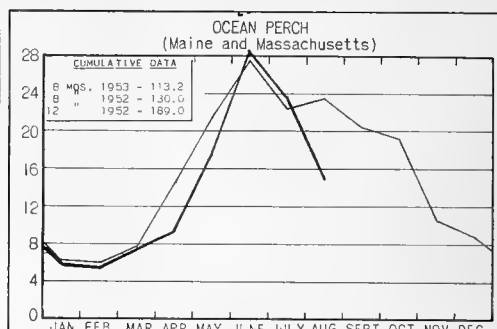
^{2/}ONLY PARTIAL--INCLUDES PRODUCTION OF MAJOR FISHERIES AND MARKET FISH LANDINGS AT PRINCIPAL PORTS.

CHART 2 - LANDINGS for SELECTED FISHERIES

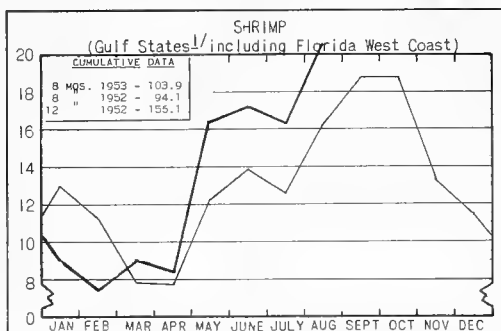
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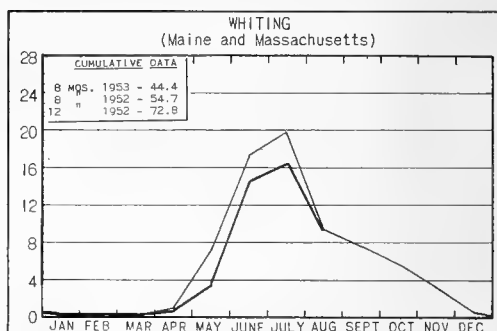
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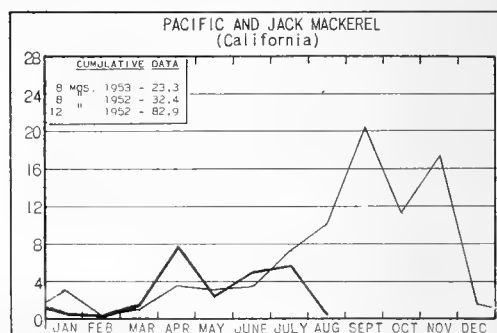
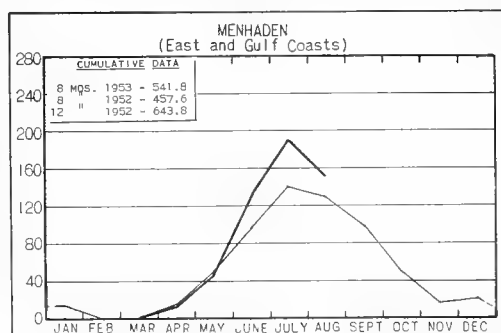
In Millions of Pounds



^{1/}LA. & ALA. DATA BASED ON LANDINGS AT PRINCIPAL PORTS AND ARE NOT COMPLETE.



In Thousands of Tons



In Thousands of Tons

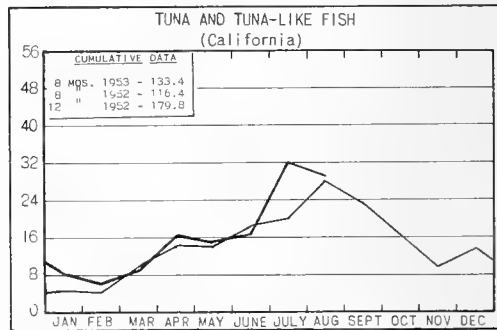
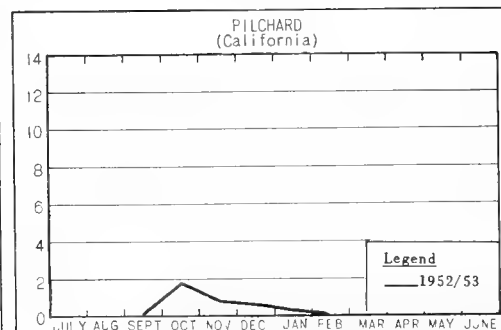
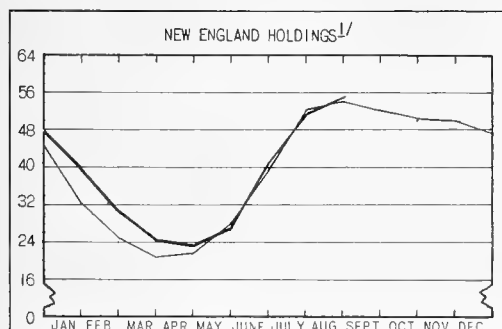
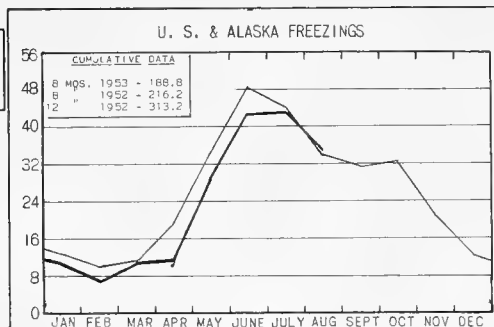
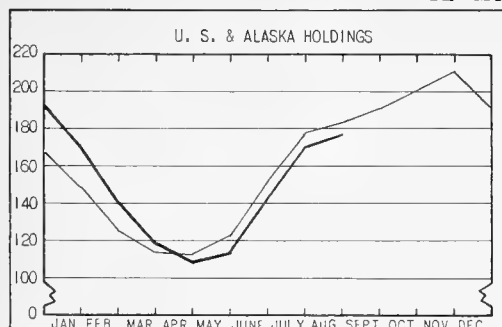
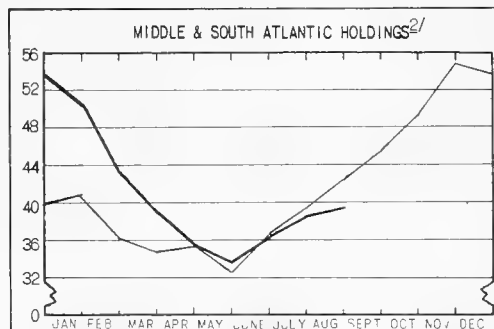


CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS *

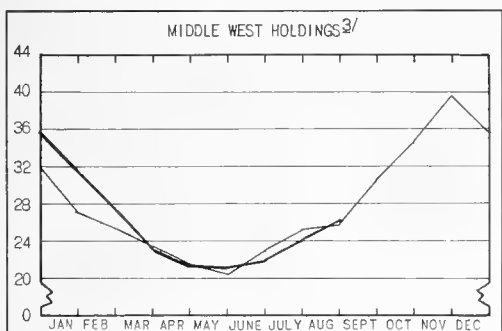
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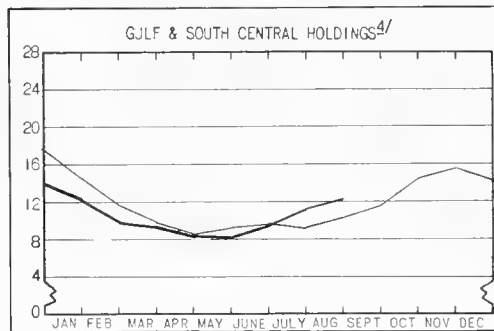
^{1/}MAINE, MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.



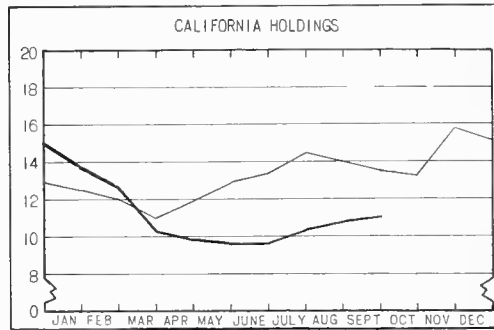
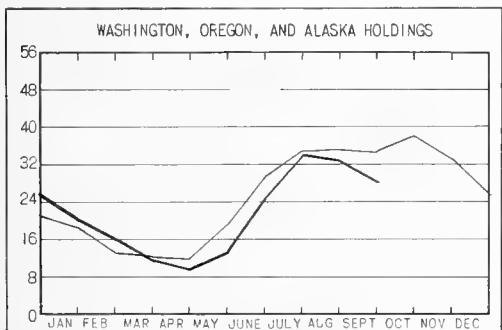
^{2/}ALL EAST COAST STATES FROM N. Y. SOUTH.



^{3/}OHIO, IND., ILL., MICH., WIS., MINN., IOWA, MO., N. DAK., NEBR., & KANS.



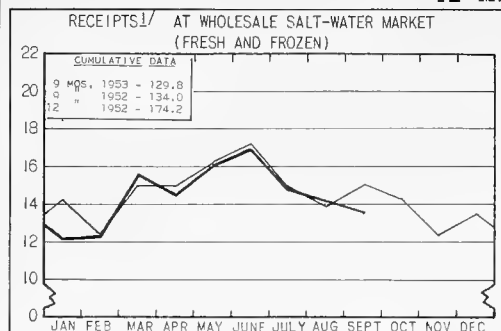
^{4/}ALA., MISS., LA., TEX., ARK., KY., & TENN.



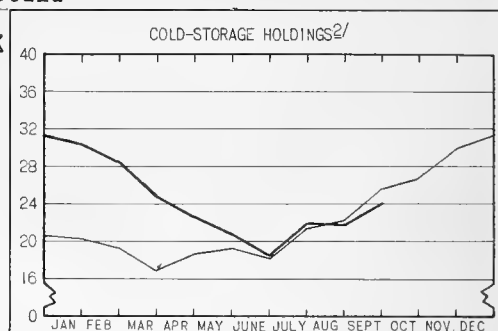
*Excludes salted, cured, and smoked products.

CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

In Millions of Pound

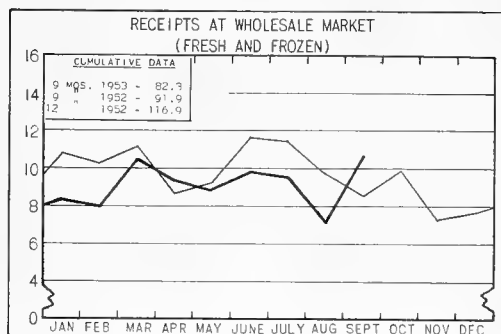


NEW YORK CITY

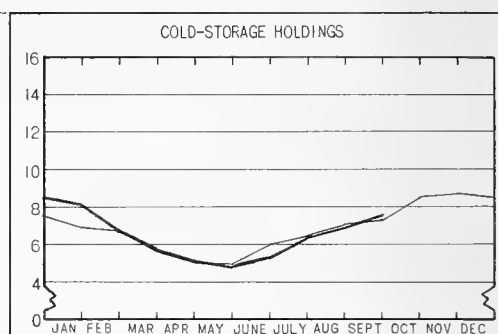


^{1/}INCLUDE TRUCK AND RAIL IMPORTS FROM CANADA AND DIRECT VESSEL LANDINGS AT NEW YORK CITY.

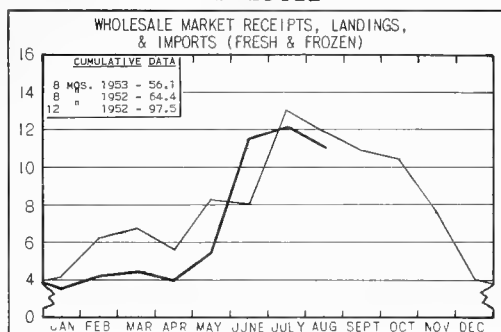
^{2/}AS REPORTED BY PLANTS IN METROPOLITAN AREA.



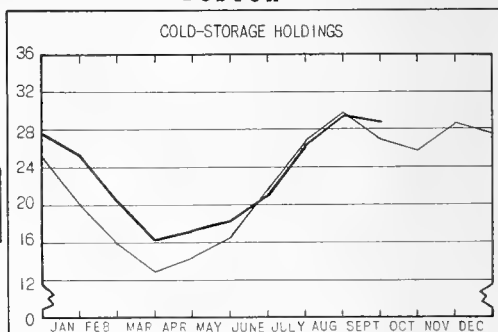
CHICAGO



SEATTLE



BOSTON



Legend

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CHART 5 - FISH MEAL and OIL PRODUCTION - U.S. and ALASKA

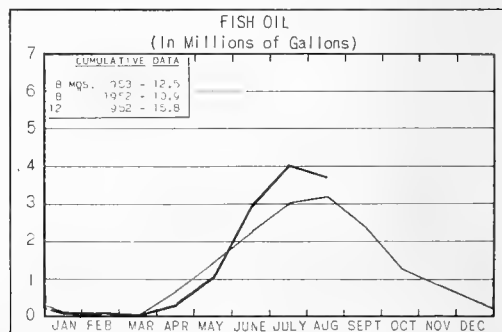
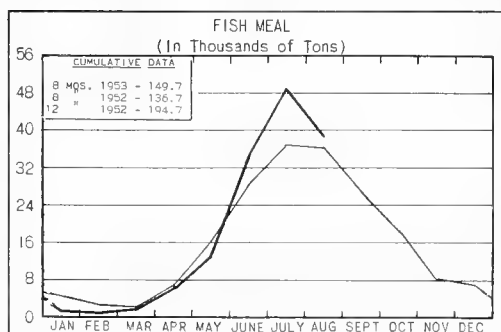
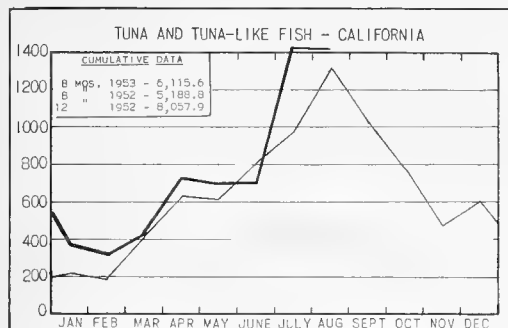


CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

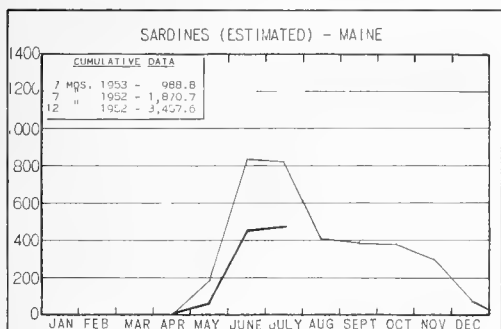
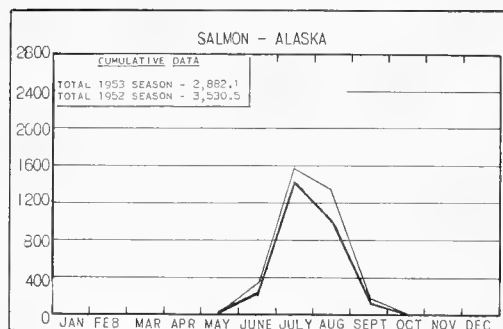
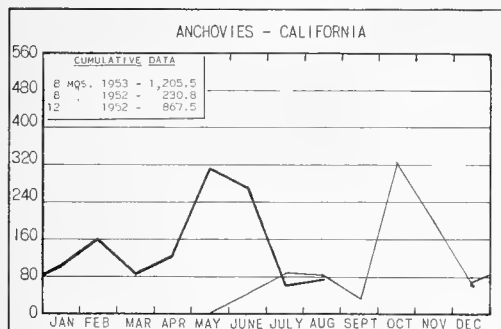
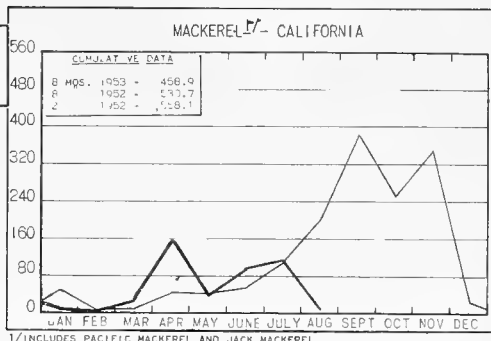
In Thousands of Standard Cases



Legend:

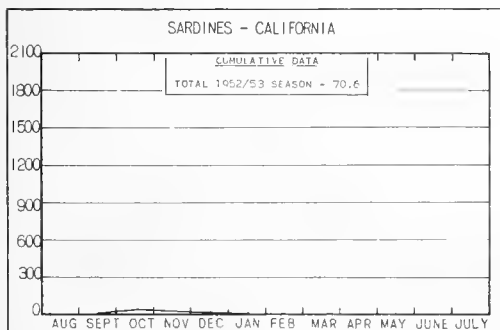
— 1953

— 1952



STANDARD CASES

Variety	No.Cans	Can Designation	Net Wgt.
SARDINES	100	1/4 drawn	3 1/2 oz.
SHRIMP	48	—	5 oz.
TUNA	48	No. 1/2 tuna	6 & 7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
SALMON	48	1-pound tall	16 oz.
ANCHOVIES	48	1/2 lb.	8 oz.



Legend:

— 1953/54

— 1952/53

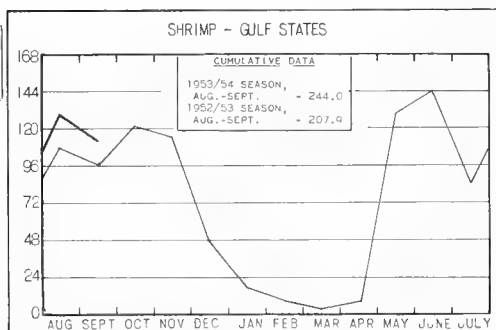
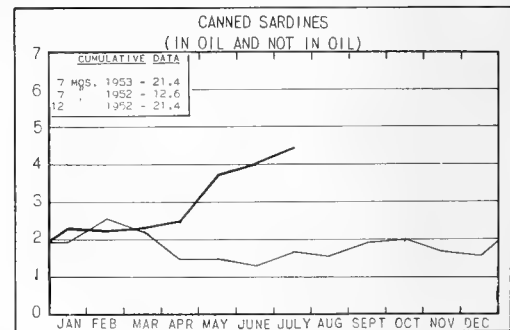
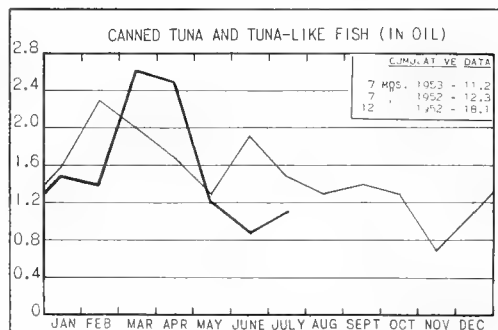
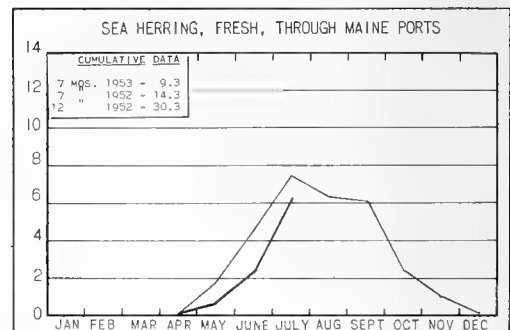
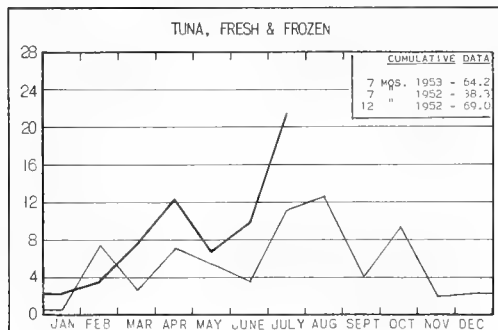
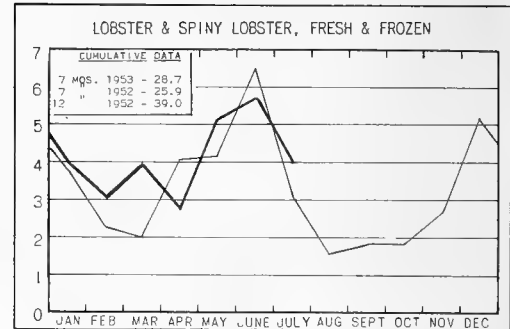
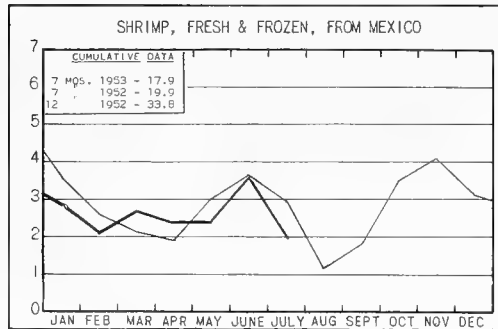
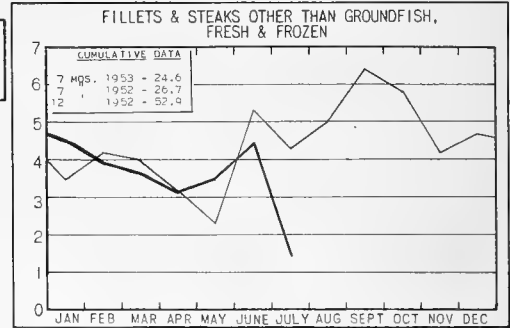
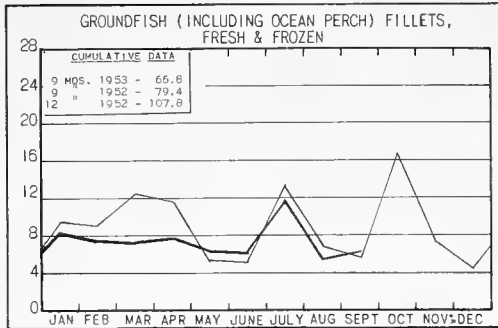


CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

In Millions of Pounds





Recent publications of interest to the commercial fishing industry are listed below.

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
 FL - FISHERY LEAFLETS.
 SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

<u>Number</u>	<u>Title</u>
CFS-909	- Fish Meal and Oil, July 1953, 2 p.
CFS-910	- Florida Landings, June 1953, 6 p.
CFS-911	- Texas Landings, July 1953, 3 p.
CFS-913	- Gulf Fisheries, 1951 Annual Summary, 9 p.
CFS-914	- South Atlantic Fisheries, 1951 Annual Summary, 8 p.
CFS-916	- Mississippi Landings, July 1953, 2 p.

<u>Number</u>	<u>Title</u>
CFS-918	- New Jersey Landings, July 1953, 2 p.
CFS-919	- Maine Landings, July 1953, 4 p.
FL -405	- Salmon Cannery Waste For Mink Feed, 31 p.
FL -412	- Menhaden Industry—Past and Present, 17 p.
Sep. No. 357	- North Pacific Albacore Tuna Exploration, 1952.

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D. C.

"Changes in the Commercial Fishery on the Alabama Portion of the Tennessee River," by Paul Bryan and Lawrence F. Miller, article, pp. 75-77. (From The Progressive Fish Culturist, vol. 15, no. 2, April 1953, processed, annual subscription \$1.25 domestic, US\$1.65 foreign.) Describes the commercial fishery of the Alabama portion of the Tennessee River; early post-impoundment fishing, 1936-45; later post-impoundment fishing, 1945-52; rebirth of the mussel industry; and discusses the present trends in relation to the sport fishery. Statistical data show the commercial fish catch for Guntersville, Wheeler, Wilson, and Pickwick Reservoirs from 1943 to 1952. Also includes statistical data on the annual harvest of mussel shells in north Alabama Tennessee Valley reservoirs for the years 1945 to 1951.

Dingell-Johnson Quarterly (For the Period July 1, 1951, to June 30, 1952), vol. 1, July 1953, 79 p., processed. This is the first of a series of publications reporting on the Federal Aid in Fish Restoration program which is designed to help the states solve their sport-fishery problems. Achievements of general interest are presented for the first year of the program from investigations, development, and land and water acquisition projects. Federal Aid in Fish Res-

toration became a reality with the passage by Congress and approval by the President of the Federal Aid in Fish Restoration Act, August 9, 1950 (64 Stat. 430). The achievement of this goal was the result of many years of effort and planning on the part of conservationists who envisioned a program designed to benefit sport fishing in the same way that the Pittman-Robertson program has benefited wildlife restoration. In substance, the above Act makes the 10-percent Federal excise tax collected on sport-fishing equipment available for apportionment to the states and territories annually under the general administration of the U. S. Fish and Wildlife Service. The states are responsible for the selection, design, and execution of projects, and expend their own funds for project operation. Upon presenting evidence of satisfactory progress or completion, the state is reimbursed to a maximum of 75 percent of costs incurred. Federal Aid in Fish Restoration is designed to supplement rather than supplant the usual state sport-fisheries program.

Fishery Statistics of the United States 1950, by A.W. Anderson and C. E. Peterson, Statistical Digest 27, 492 p., illus., printed, \$2.00, 1953. Fish and Wildlife Service, U. S. Department of the Interior, Washington, D. C. (For sale by the Superintendent of Documents, Washington 25, D. C.)

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D. C.

Presents the results of the first complete statistical survey made of the United States and Alaska fishery industry since 1931. Previous complete surveys of the U. S. fisheries were made only in 1908 and 1931. In recent years canvasses of the fisheries of most sections of the country were made annually. However, no data on the fisheries of the Mississippi River area were assembled since 1931, and since 1940 only partial surveys were made of the fisheries of the Great Lakes, South Atlantic, and Gulf States. This sourcebook is the latest in a series of annual statistical reports which contain data on the catch of fishery products and its value, employment in the fisheries, quantity of gear operated, and the number of fishing craft employed in the capture of fishery products. Information on the quantity and value of the production of manufactured fishery products and by-products is also shown. For the first time since 1945, data on the catch and operating units by counties are shown for the entire Atlantic and Gulf coastal areas, except Maryland. Where available, summary information from 1880--when the first comprehensive statistical survey of the fisheries and fishery industries of the United States was made--to date is included. Outstanding developments during 1950 were the record landings of tuna and tuna-like fishes; the continued high production of menhaden; and the expansion of the shrimp fishery in the Gulf area. A total of 161,463 fishermen, 11,496 vessels of 5 net tons capacity or greater, and 80,814 boats were employed in the commercial fisheries of the United States and Alaska in 1950. During this year the catch of fishery products in all sections of the United States and Alaska totaled 4,884,909,000 pounds, valued at \$343,876,000 to the fishermen. This was an increase of 2 percent in quantity and 1 percent in value compared with the partially estimated production of 1949. The average price of all fish to the fishermen decreased slightly from 1949 to 1950, although the values were generally variable and the prices of some species increased. San Pedro, Calif., continued to be the Nation's leading fishing port, both in quantity and value with landings of approximately 940 million pounds, valued at \$43.5 million to the fishermen. Gloucester, Mass., was in second place, with approximately 196 million pounds, followed by San Diego, Calif., with approximately 190 million pounds. The per-capita consumption of fishery products in the U. S. in 1950 totaled 11.5 pounds, edible weight. During the previous year the per-capita consumption was 11.4 pounds. This was considerably above the wartime level of approximately 9 pounds when a large portion of the canned pack was allocated to the Armed Forces and to lend-lease distribution. The 1935-39 average was 11.1 pounds. Fishery statistics of the U. S. and

Alaska are compiled and published annually to make available information on both the economic and biological aspects of the domestic commercial fisheries.

Phosphorus Exchange in Marine Phytoplankton, by Theodore R. Rice, Fishery Bulletin 80 (From Fishery Bulletin of the Fish and Wildlife Service, Volume 54), 16 p., illus., printed, 15 cents, 1953. Phosphorus exchange in Nitzschia closterium, isolated and grown in pure culture, was demonstrated by using radioactive phosphorus and was shown to vary with changes in the phosphorus concentration of the medium and with the physiological conditions of the cells.

"A Report on the Fisheries of East Bengal, Pakistan," by A. R. K. Zobairi, article, pp. 116-20. (From The Progressive Fish Culturist, vol. 15, no. 3, July 1953, processed, annual subscription \$1.25 domestic, US\$1.65 foreign). Describes the fishery resources of the Province of East Bengal, the inland and marine fisheries, and how the Government aids the fishing industry.

Spawning of Yellowfin Tuna in Hawaiian Waters, by Fred C. June, Fishery Bulletin 77 (From Fishery Bulletin of the Fish and Wildlife Service, Volume 54), 21 p., illus., printed, 15 cents, 1953. This paper deals with the spawning of the yellowfin tuna (Neothunnus macropterus) in Hawaiian waters, with particular reference to the reproductive process. Frequency distributions of the diameters of ova from 112 yellowfin tuna, captured by long-line gear in Hawaiian waters during 1950, demonstrate that several developmental groups of ova are present in the ovaries of this species during the breeding season. Based on the position of the mode of the most mature group of ova present in the ovaries, 11 arbitrary stages of maturity are defined which trace the development of the ova from the immature or resting stage through the spawning stage. A simple ovary-weight to fish-weight relation is given whereby spawning and nonspawning fish may be distinguished without laborious ova-diameter measurements. Over the size range of fish examined, 36.3 to 94.3 kilograms (80 to 208 pounds), the ovary-weight to fish-weight relation was found to be linear for ovaries in the immature, or resting, stage and in one of the maturing stages. However, the slopes and levels of the two regressions were significantly different. The calculated number of ova produced at a single spawning by individual yellowfin tuna, over the size range 47.2 to 88 kilograms (104 to 194 pounds), increased with fish size and ranged from 2,370,000 to 8,590,000. Spawning of the yellowfin tuna in Hawaiian waters during 1950 took place between mid-May and the end of October, and coincided with the period of best long-line catches of the species.



MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE AGENCIES ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE AGENCIES OR PUBLISHERS MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

The Conservation Yearbook 1953, 322 p., illus., printed, \$5.50. The Conservation Yearbook, 1740 K Street NW., Washington 6, D. C., 1953. This book is designed as an annual directory and guide to agencies, commissions, boards, associations, foundations, societies, and other organizations concerned with the conservation of renewable natural resources, to the men and women who plan and direct the conservation program, and as an authoritative source of information on the progress of this program. Contains up-to-the-minute facts and figures in all fields—soil and water, forests and forest products, wildlife and fisheries, the rangelands, parks and the wilderness, etc.; a directory of more than 500 conservation organizations; and more than 5,000 names of key policy makers, legislators, planners, executives, managers, technicians, editors and writers, etc. The sections on fisheries include data on apportionment of funds to the states and territories for use in fish restoration and management projects for fiscal year 1952; list of the fish-culture stations maintained by the Fish and Wildlife Service; fishing licenses issued, 1933-1951; fishing license sales by states, July 1, 1950, to June 30, 1951; and a list of state game and fish departments and commissions.

(FOA) Monthly Report of the Foreign Operations Administration to the Public Advisory Board (Data as of May 31, 1953), 79 p., illus., processed. Division of Statistics and Reports, Foreign Operations Administration, Washington 25, D. C. This issue, which contains data through May 31, 1953, summarizes the activities of the Mutual Security Agency. Charts and appendix tables on the European Program cover MSA/ECA operations beginning with April 3, 1948. Charts and appendix tables on the Far East Program cover MSA/ECA operations under the China Area Aid Act of 1950. A section of the report deals with rice in Asia.

"The Future of Echo Detection," by R. E. Craig, article, World Fishing, August 1953, vol. 2, no. 8, pp. 303-7, illus., printed, single copies 2s. 6d. (35 U. S. cents). John Trundell (Publishers) Ltd., London, E. C. 4, England. Some of the possibilities in the development of echosounding apparatus are surveyed in this article. The effectiveness of frequencies rather higher than those used in the British commercial fisheries, means of increasing the signal to noise ratio, method of presentation of paper recording, and methods of mounting oscillators horizontally for fish finding are discussed.

The Gulf of Mexico Sponge Investigation, by Charles E. Dawson, Jr., and F. G. Walton Smith, Technical Series No. 1, 28 p., illus., printed. Marine Laboratory, University of Miami, Coral Gables 34, Florida, 1953. Report on a survey of the Florida commercial sponge beds from Dry Tortugas to Panama City during 1947 and 1948. Studies were made of the oceanographic conditions and fauna at 38 stations. No commercial sponges were found in

depths over 10 fathoms. Commercial sponges were found at 12 stations in depths between 3 and 10 fathoms. Abnormal biological conditions were observed at only one station. Although evidences of recent damage to individual commercial sponges were noted at several locations, no recurrence of the 1939 sponge disease was indicated. Oceanographic conditions were generally within the range common to inshore Gulf of Mexico waters, and at no station did they deviate sufficiently to be considered detrimental to the bottom-living organisms. Few sponges of commercial size were found at any locality, and the scarcity of small commercial sponges precludes the early recovery of the Florida sponge industry. The authors point out that since 1948 the number of diving boats working the Florida sponge beds has steadily declined. A recent inquiry at Tarpon Springs showed that there are now fewer than 20 diving boats operating full time in the Florida sponge fishery. This situation will prove beneficial and hasten the recovery of the beds, state the authors. The reduction in fishing intensity will permit the remaining sponges to reach maximum size. In conjunction with this effect, a widespread seeding of the depleted grounds with small sponges is to be expected. Assuming that there is no further mass mortality, this new growth of sponge should be available for commercial exploitation in from 7 to 8 years. The authors recommend that the State of Florida enact legislation and establish sound procedures for the strict enforcement of the five-inch minimum size limit.

"Missouri Shell Game," by Jim Keefe, article, Missouri Conservationist, August 1953, vol. 14, no. 8, pp. 4-5, 12, illus., printed. Missouri Conservation Commission, Jefferson City, Missouri. Describes briefly the life history of the mussel found in the waters of the Mississippi Valley and the mussel button and novelty industry.

"A Population Study of the Tasmanian 'Commercial' Scallop, *Notovola meridionalis* (Tate) (Lamellibranchiata, Pectinidae)," by W. S. Fairbridge, article, Australian Journal of Marine and Freshwater Research, May 1953, vol. 4, no. 1, pp. 1-40, illus., printed, 7s. 6d. per issue (US\$1.05). Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, East Melbourne, C. 2, Victoria, Australia. Describes a population study of the "commercial" scallop, *Notovola meridionalis*, which supports a dredge fishery in the D'Entrecasteaux Channel, Tasmania. Includes discussions on environment, the fishery and methods of capture, the history of the fishery, populations of the commercial scallop, age determination and growth of the commercial scallop, and the age and size composition of the commercial scallop stocks.

"Predatory Seals and the Commercial Fishing Industry," by Eric Hardy, article, World Fishing, August 1953, vol. 2, no. 8, pp. 310-13, illus., printed, single copies 2s. 6d. (35 U. S. cents). John Trundell (Publishers) Ltd., London, E. C. 4, England. Much controversy exists as to the influence of predatory

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habits of seals on commercial fisheries. On the Skeena River, British Columbia, Canada, it has been estimated that a seal population of 450 destroyed approximately 10 pounds of fish each daily--a serious threat to the salmon fishery there--while salmon fishermen at Whitby, England, have been given permission to destroy seals which, it is claimed, are wreaking havoc with their livelihood. This article deals with the relation between seals and the commercial fisheries in various parts of the world, and describes the four British seals.

Refrigeration in America by Oscar Edward Anderson, Jr., 355 p., printed, illus., \$6.00. Princeton University Press, Princeton, N. J., for University of Cincinnati, 1953. The subtitle "A History of a New Technology and Its Impact" is an accurate summary of the book. There is compiled an exhaustively detailed and referenced account of refrigeration both from ice and mechanical equipment. Beginning with the harvest and use of natural ice, the author traces its application to food preservation in the United States. Mechanical refrigeration is likewise followed through the early developmental period and into the subsequent applications. Some of the other fields covered in the book include the ice industry and domestic refrigeration, refrigerated transport, the cold-storage plant's struggle to attain recognition, impact of refrigeration on food supplies and habits, home and locker-plant applications, and miscellaneous other industrial applications. The bibliographical note is an excellent resume of recommended sources for information on the many fields of research and development that have contributed to the advance of refrigeration to its present importance in the United States. The extensive footnotes are very worthwhile to further highlight the points made in the text.

—Charles Bulter

"Status of the Fishery for Sea Mullet (Mugil cephalus Linnaeus) in Eastern Australia," by J. M. Thomson, article, Australian Journal of Marine and Freshwater Research, May 1953, vol. 4, no. 1, pp. 41-81, illus., printed, 7s. 6d. per issue (US\$1.05). Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, East Melbourne, C. 2, Victoria, Australia. Various shortcomings of the statistical systems in vogue in the fisheries of the eastern States of Australia are discussed from the viewpoint of a biologist. It is impossible to compute an estimate of the catch per-unit-of-effort involving a time factor. The annual mullet catch for the whole eastern seaboard has remained substantially about 11,000,000 pounds for the past 10 years, but the total caught in any subdivision of the area has fluctuated widely. The Clarence River, Fort Macquarie, Maryborough, and Wallis Lake

areas are the most important producers. There is a high degree of correlation between the fluctuations in the mullet catch and those in the total catch of estuarine fish. The size and age composition of the mullet catch have shown only slight variation over the last 10 years, and there is no significant variation in this respect from the composition in 1903. The fluctuations in catch and catch per man are not inconsistent with theories of overfishing nor with those of natural population cycles; but the only theory which receives confirmation independently of the curves of catch and of catch per man is an economic one. Competition from both the trawling industry and the import industry has been responsible for the characteristics of the estuarine catch curves. It is estimated that the weight of meat to be gained from recent changes in the management of the fishery could at best be considerably less than the amount of annual variation in the catch.

(United Kingdom) Herring Industry Board, Eighteenth Annual Report for the Year Ended 31st December 1952, Cmd. 8840, 41 p., printed, 1s. 6d. net (21 U. S. cents). Her Majesty's Stationery Office, London, England, 1952. A report of the British herring fisheries, with data on marketing, research and development, and the herring fleet. A discussion of the commercial and statutory arrangements between or concerning the Herring Industry Board, the catchers, and the shore-based sections of the industry is presented. The statistical tables in this report cover total catch, utilization, exports, and prices of herring. The marketing problem and the program for constructing reduction factories are also discussed.

"Use of Chilled Sea Water in Place of Ice in Transporting Fish," by A. W. Lantz, article, Progress Reports of the Pacific Coast Stations, No. 95, July 1953, pp. 39-44, illus., processed. Fisheries Research Board of Canada, Pacific Fisheries Experimental Station, Vancouver 2, B. C. Describes a study which involves the mechanical chilling of sea water in a fish storage tank and maintaining the water at 29°F. to 30°F. for transporting fish aboard a fishing vessel. An illustration shows one proposed application of this system for the hold of a troller vessel, using eutectic plates spaced to provide chilled sea water in each of six compartments. These compartments or sections replace the fish pens in conventional fish-hold construction. An outstanding feature of the system is that it can be installed in wooden fishing craft without insulating the hull. It also eliminates the carrying and handling of ice, thus reducing operating and labor costs. Another illustration shows a further modification of this system in which the supporting walls or lateral bulkheads replace the eutectic plates; a bank of refrigerating coils is placed at one end and circulation of the sea water is obtained by a pumping system. The equipment can be adapted to any type of boat.



CONTENTS, CONTINUED

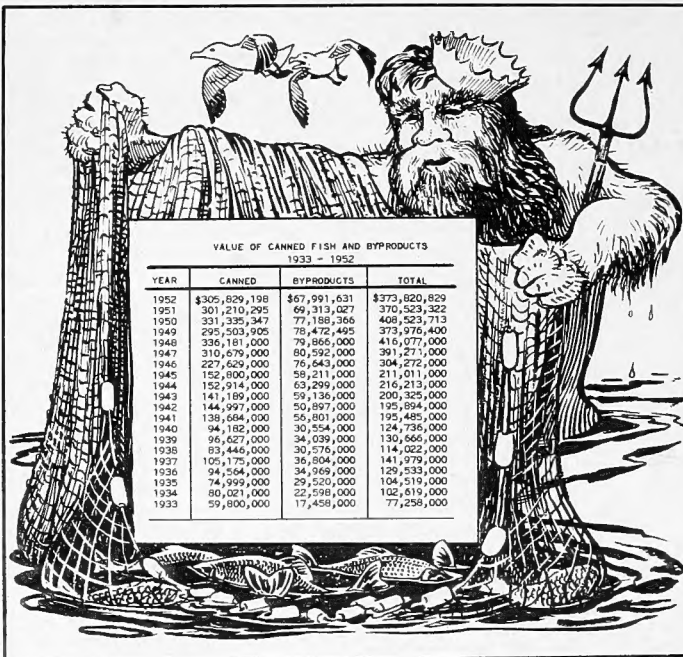
	PAGE		PAGE
TRENDS AND DEVELOPMENTS (CONTD.):		FOREIGN (CONTD.):	
U. S. CUSTOMS LAWS REGARDING LANDINGS OF FISH FROM JOINT U. S.-JAPANESE FISHING OPERATIONS	44	JAPAN (CONTD.):	
WHOLESALE PRICES, AUGUST 1953	45	NORTH PACIFIC SALMON EXPEDITION CATCH EXCEEDS TARGET	56
FOREIGN:	47	LIBERIA:	
INTERNATIONAL:		FAO EXPERTS AID FISHERIES	57
UNITED NATIONS KOREAN RECONSTRUCTION AGENCY (UNKRA):		NORWAY:	
FISHING VESSELS SOUGHT	47	FROZEN FILLETS STORED AT TRONDHEIM FOR EXPORT TO UNITED STATES	57
ADVISORY COMMITTEE APPROVES KOREAN REHABILITATION PROGRAM	47	BARENTS SEA COD INVESTIGATIONS	58
INTER-AMERICAN TROPICAL TUNA COMMISSION: SAN DIEGO MEETING	47	BRISLING SARDINE PACK UP	58
WHALING:		TUNA CATCH POOR	58
ANTARCTIC 1953/54 CATCH QUOTA REDUCED	48	PANAMA:	
CANADA:		FISHING REGULATIONS AMENDED	58
BRITISH COLUMBIA PATROL VESSELS SCOUT FOR TUNA	48	COMMERCIAL FISHING ESTABLISHES RECORD YEAR	58
FISHERMEN'S INDEMNITY FUND GOES INTO EFFECT	49	PERU:	
FISHING INDUSTRY LACKS SUFFICIENT COLD-STORAGE FACILITIES	50	SOUTH PACIFIC TERRITORIAL WATERS DECLARATION APPROVED	59
SASKATCHEWAN STUDIES GREATER FISHERY UTILIZATION OF ITS LAKES	50	SPAIN:	
CHILE:		SHRIMP SHIPPED TO U. S.	59
TAX EXEMPTIONS AND OTHER BENEFITS GRANTED TO FISHERIES	50	THAILAND:	
COLOMBIA:		TILAPIA CULTURE	59
NEW FISH CANNERY RECEIVES FIRST FISHING VESSEL FROM SWEDEN	51	UNION OF SOUTH AFRICA:	
DENMARK:		CANNED FISH EXPORTS TO U. S. INCREASED FISHERMEN'S TRAINING SCHOOL	60
U. S. GOOD MARKET FOR DANISH FISHERY PRODUCTS	52	UNITED KINGDOM:	
ECUADOR:		WHITE FISH AUTHORITY TO SURVEY OPERATING COSTS OF DISTANT-WATER TRAWLERS	61
NEW TUNA FIRM FORMED BY U. S. CITIZEN . FISHING FOR GOATFISH BY FOREIGN VESSELS BANNED OFF GALAPAGOS ISLANDS	52	PREFABRICATED REFRIGERATED WAREHOUSES . UNDERWATER TELEVISION CAMERA VIEWS SEA BOTTOM	62
GERMAN FEDERAL REPUBLIC:		RUSSIA ORDERS TRAWLERS	62
EAST GERMANY PLACES LARGE FISH ORDERS .	53	SCOTTISH PORT TO TRAIN FISH WORKERS .	63
GREECE:		FEDERAL ACTIONS:	64
IMPORTS OF FISHERY PRODUCTS, 1952	53	DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE:	
SCOTTISH TRAWLER PURCHASED	53	FOOD AND DRUG ADMINISTRATION:	
ICELAND:		HEARING ON PACIFIC OYSTER STANDARDS ..	64
TRADE AGREEMENT WITH RUSSIA INVOLVES LARGE QUANTITIES OF FISHERY PRODUCTS .	54	FISHERY INDICATORS:	65
LOANS FROM INTERNATIONAL BANK TO DEVELOP AGRICULTURE AND LESSEN DEPENDENCE ON FISHERIES	54	CHART 1 - FISHERY LANDINGS FOR SELECTED STATES	65
INDIA:		CHART 2 - LANDINGS FOR SELECTED FISHERIES	66
FISHERIES DEVELOPMENTS	54	CHART 3 - COLD-STORAGE HOLDINGS AND FREEZINGS OF FISHERY PRODUCTS	67
JAPAN:		CHART 4 - RECEIPTS AND COLD-STORAGE HOLDINGS OF FISHERY PRODUCTS AT PRINCIPAL DISTRIBUTION CENTERS	68
CANNED TUNA EXPORT PRICES	55	CHART 5 - FISH MEAL AND OIL PRODUCTION, UNITED STATES AND ALASKA	68
TUNA EXPORT LEGISLATION MAKES NO PROGRESS	55	CHART 6 - CANNED PACKS OF SELECTED FISHERY PRODUCTS	69
TUNA MOTHERSHIP EXPEDITION REPORTS GOOD CATCHES	55	CHART 7 - U.S. FISHERY PRODUCTS IMPORTS	70
BERING SEA CRAB EXPEDITION COMPLETES SUCCESSFUL SEASON	56	RECENT FISHERY PUBLICATIONS:	71
		FISH AND WILDLIFE SERVICE PUBLICATIONS .	71
		MISCELLANEOUS PUBLICATIONS	72



CANNED FISH AND BYPRODUCTS, 1952

Canned Fish & Byproducts, 1952, Annual Summary, C. F. S. No. 882, was recently issued by the Service's Branch of Commercial Fisheries. This 20-page

publication presents data on the U. S., Alaska, and Hawaii 1952 pack of canned fish and shellfish by commodities and by states. The number of plants canning or producing products and byproducts is also given by area and by state, and historical statistics are included for certain major packs by species.



The pack of canned fishery products in the United States, Alaska, and Hawaii in 1952 amounted to 815,212,863 pounds, valued at \$305,829,198 to the packers--an increase of 2 percent in quantity and value as compared with 1951. These increases resulted principally from larger packs of tuna and Maine sardines. Canned fishery products were packed in 445 plants in 25 states and Alaska and Hawaii during 1952.

California and Hawaii led in the production of canned fishery products with a pack of 319,350,425 pounds, valued at \$124,582,452. Alaska was second with 172,409,845 pounds, valued at \$77,586,903.

The 1952 production of fishery byproducts in the United States and Alaska was valued at \$67,991,631--2 percent less than in the previous year. The principal byproducts were marine-animal oils, 16,094,409 gallons (valued at \$9,391,368); marine-animal scrap and meal, 221,403 tons (valued at \$27,161,654); marine pearl-shell, oyster shell, and fresh-water shell products valued at \$14,702,673; and fish solubles and homogenized condensed fish valued at \$5,979,865. Byproducts were produced in 255 plants in 25 states and Alaska during 1952.

Copies of this bulletin, C. F. S. No. 882, are available free upon request from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.

128-D

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OFFICIAL BUSINESS

WASHINGTON 25, D. C.

FISH AND WILDLIFE SERVICE

DEPARTMENT OF THE INTERIOR

UNITED STATES

